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CIRCULAR No. 202 FEBRUARY, 1932
UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.

AGRONOMIC WORK OF THE BIG SPRING, TEX., FIELD STATION—1915-1929

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INTRODUCTION

The United States Dry Land Field Station, Big Spring, Tex., is the most southern of a group of 24 stations located in the Great Plains at which coordinated experiments in crop rotation and tillage methods have been conducted by the Division of Dry Land Agriculture. Other divisions of the Bureau of Plant Industry have cooperated in conducting experiments with field crops and fruits. The Bureau of Animal Industry and the Texas Agricultural Experiment Station have cooperated in feeding experiments with steer calves, the results of which have been reported in other publications.[1]

The station is 1 mile north of Big Spring, Tex., practically on the line between the northern edge of the Edwards Plateau and the southern border of the Llano Estacado. This line marks, in a general way, the division between the farming and ranching districts of western Texas. With the exception of a few isolated tracts where irrigation is practiced, there is no farming of any consequence on that section of the Edwards Plateau which extends south of Big Spring. The soil of that section is shallow, more or less rocky, and of such a low water-holding capacity that profitable crops can not be produced on the limited rainfall. On the other hand, it has many natural advantages as grazing land.

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[1] Black, W. H., Jones, J. M., and Keating, F. E. SORGO SILAGE, SORGO FODDER, AND COTTONSEED HULLS AS ROUGHAGES IN RATIONS FOR FATTENING CALVES IN THE SOUTHWEST. U. S. Dept. Agr. Tech. Bul. 43, 24 p., illus. 1928.
Jones, J. M., Black, W. H., and Keating, F. E. SORGO SILAGE, SORGO FODDER AND COTTONSEED HULLS AS ROUGHAGES IN RATIONS FOR FATTENING CALVES. Tex. Agr. Exp. Sta. Bul. 363, 36 p., illus. 1927.

The station farm is typical of that vast area of the South Plains extending from Big Spring northward to the High Plains. This region is being developed into one of the best cotton-growing sections of western Texas.

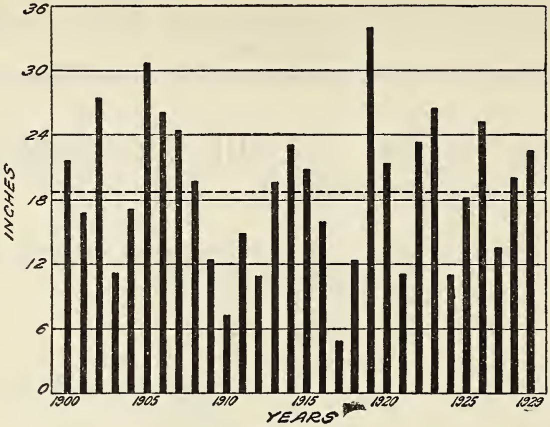

FIGURE 1.—Annual precipitation at Big Spring, Tex., 1900–1929

SOIL

The soil of the station is a light sandy loam that has been classified as an Amarillo fine sandy loam. It is from 3 to 5 feet deep and is typical of a large part of the South Plains.

The subsoil, commonly called caliche, is composed of a calcareous infiltration which has cemented the particles of sand together in such a way that a very impervious stratum has been formed. The porous soil above the subsoil stratum makes it possible to grow profitable crops with a minimum rainfall.

CLIMATIC CONDITIONS

The weather data presented herein were obtained at the field station, with the exception of the precipitation from January, 1900, to May, 1915, inclusive, which was obtained from the observer for the United States Weather Bureau at Big Spring.

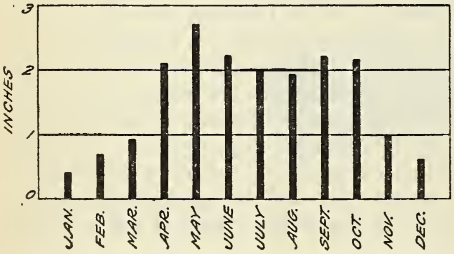

FIGURE 2.—Mean monthly precipitation at Big Spring, Tex., 1900–1929

PRECIPITATION

Although the amount of precipitation is generally considered the limiting factor in crop production in this section, proper distribution of rainfall is of almost equal importance. In many instances where torrential rains occur and a large amount of run-off takes place the records show heavy rainfall for the year, but crop yields were not increased accordingly. Much larger crops have been produced in years of less total rainfall which was, however, more uniformly distributed.

Table 1 shows the monthly, seasonal, and annual precipitation at Big Spring for the 30 years from 1900 to 1929. The mean annual precipitation for this period was 18.77 inches, of which 13.01 inches, or nearly 70 per cent, fell during the growing season from April to September, inclusive. The annual precipitation has ranged from 4.68 inches in 1917 to 34.01 inches in 1919. Figure 1 shows the annual precipitation from 1900 to 1929. The precipitation was below the average 14 out of the 30 years. Figure 2 shows the mean monthly precipitation during the same 30-year period.

TABLE 1.—*Monthly, seasonal, and annual precipitation at Big Spring, Tex., 1900–1929*

[Data in inches. T = trace. The records from January, 1900, to May, 1915, were obtained by the United States Weather Bureau at Big Spring. Those from June, 1915, to December, 1929, were obtained at the field station]

Year	Monthly precipitation												Seasonal precipitation (Apr. to Sept.)	Annual precipitation
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
1900	0.56	0.25	0.99	5.12	4.32	1.71	0.99	1.65	2.77	2.04	1.18	0.13	16.56	21.71
1901	.11	1.93	T	1.07	2.97	1.06	4.73	.11	3.03	.58	1.00	.24	12.97	16.83
1902	.61	.02	T	.56	4.55	1.41	12.89	1.24	2.46	.92	2.28	.34	23.11	27.28
1903	.81	.86	.24	.08	1.55	2.93	.36	.79	3.16	.22	0	T	8.87	11.00
1904	.25	T	0	1.12	3.40	4.06	.75	2.27	3.45	.50	.88	.43	15.05	17.11
1905	.45	1.39	2.89	3.34	5.71	3.52	3.40	2.50	3.38	1.79	1.74	.77	21.85	30.88
1906	.31	.81	.87	2.98	3.52	2.56	4.41	5.08	.84	1.11	2.96	.51	19.39	25.96
1907	.17	0	1.69	.22	1.97	.86	1.81	1.52	2.79	11.87	1.37	.27	9.17	24.54
1908	.43	.06	.28	5.47	4.09	.99	1.79	2.90	2.01	.25	1.40	0	17.25	19.67
1909	.02	T	.42	.01	2.17	1.62	.65	1.23	.70	.79	4.01	.64	6.38	12.26
1910	.23	.03	.28	1.00	.69	.71	1.24	.04	.42	2.32	.17	.12	4.10	7.25
1911	.58	4.20	.43	2.55	.32	.30	1.34	.37	1.79	.25	.18	2.53	6.67	14.84
1912	T	1.02	.17	.55	1.10	1.19	1.25	1.04	1.16	1.50	1.13	.99	6.29	11.10
1913	.29	.53	1.41	1.44	1.08	3.28	.97	.04	2.72	3.22	1.89	2.62	9.53	19.49
1914	.27	.04	.77	.58	4.29	4.00	1.44	3.99	.78	4.37	1.04	1.43	15.08	23.00
1915	.45	.15	.83	5.75	.44	1.58	3.43	3.26	2.95	1.33	0	.67	17.41	20.84
1916	.13	0	1.74	2.12	.14	1.59	2.48	4.31	.87	1.30	1.01	.10	11.51	15.79
1917	.28	0	.03	.97	.61	.98	.73	.17	.79	0	.12	0	4.25	4.68
1918	.60	.73	.09	.10	1.19	3.53	.16	.24	1.66	1.99	.74	1.32	6.88	12.35
1919	.57	.06	3.06	1.45	1.43	8.28	.95	3.60	7.43	6.31	.78	.09	23.14	34.01
1920	1.97	.20	.12	.08	5.32	1.33	.91	6.30	.69	1.95	2.22	.20	14.63	21.29
1921	.25	.90	1.15	.11	3.69	2.77	.45	.85	.71	.23	T	T	8.58	11.11
1922	.38	.08	1.73	12.77	2.36	2.89	.38	.22	0	1.15	1.35	0	18.62	23.31
1923	.29	3.01	2.16	4.58	1.24	2.61	1.68	.98	1.53	5.31	1.18	1.69	12.62	26.26
1924	.03	.50	.62	.91	3.62	.05	.96	2.03	.68	1.42	.05	.13	8.25	11.00
1925	.15	0	T	4.43	2.09	1.00	1.22	2.96	3.06	3.11	.14	0	14.76	18.16
1926	.98	.06	2.18	2.24	1.96	4.38	2.27	1.62	3.56	3.49	.32	2.19	16.03	25.25
1927	.53	1.69	.27	1.10	1.28	2.18	1.22	.42	4.00	.45	T	.42	10.20	13.56
1928	.35	.75	.02	.48	10.10	.95	1.87	2.68	.76	1.31	.71	.06	16.84	20.04
1929	.32	.85	2.89	.13	3.18	1.08	2.81	1.72	5.44	3.28	.74	0	14.36	22.44
Mean	.41	.67	.91	2.11	2.68	2.18	1.98	1.87	2.19	2.15	1.02	.60	13.01	18.77

WIND VELOCITY

The wind velocity not only influences the quantity of evaporation but determines to a certain extent the cultural practices that must be followed, especially on the light sandy soils. The wind velocity is recorded by an anemometer exposed at a height of 2 feet above the ground.

Figure 3 shows the mean monthly wind velocity. The means for the six months April to September, inclusive, are for the 14 years from

1916 to 1929, inclusive. The means for the other six months are for the 11 years from 1919 to 1929, inclusive.

The lowest monthly wind velocity occurs during October and November. It gradually increases from that point until it reaches its maximum during March and April. During these months of high wind movement special precautions must be taken to prevent soil blowing.

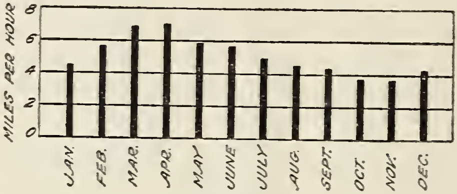

FIGURE 3.—Mean monthly wind velocity at Big Spring, Tex., for the six months April to September, 1916–1929, and for the six months January to March and October to December, 1919–1929

TEMPERATURE

Figure 4 shows the mean monthly maximum and minimum temperatures for the 14 years from 1916 to 1929, inclusive. The highest monthly mean maximum temperature was 95° F., in July, and the lowest monthly mean minimum temperature was 27°, in January.

During the 14 years from 1916 to 1929, inclusive, the mean date of the last killing frost in the spring was March 28, and the mean date of the first killing frost in the fall was November 5. This gives a mean frost-free period of 222 days, which is ample for the crops that are grown.

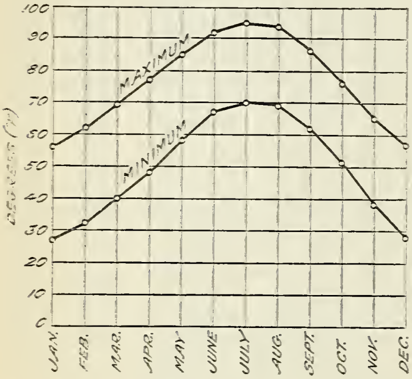

FIGURE 4.—Mean monthly maximum and minimum temperatures at Big Spring, Tex., 1916–1929

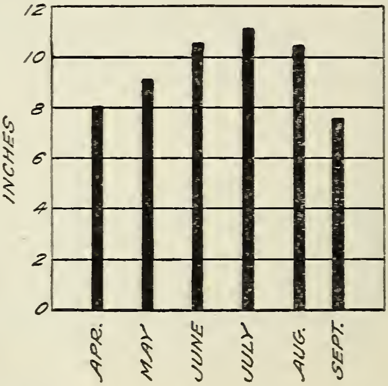

FIGURE 5.—Mean monthly evaporation at Big Spring, Tex., for the six months April to September, 1916–1929

EVAPORATION

Daily records are kept of the evaporation from a free-water surface from April 1 to September 30 each year. Table 2 gives the monthly and seasonal evaporation for each year and the means for the 14 years from 1916 to 1929. The mean seasonal evaporation is 56.645 inches, or nearly 4.4 times the mean precipitation (12.9 inches) for the same period. The mean monthly evaporation for the six months April to September from 1916 to 1929, inclusive, is shown in Figure 5.

TABLE 2.—*Monthly and seasonal evaporation at Big Spring, Tex., during the growing season from April to September, 1916–1929*

Year	Monthly evaporation in—						Seasonal evaporation (April to September)
	April	May	June	July	August	September	
	Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1916	6. 610	10. 838	13. 291	10. 435	9. 243	7. 714	58. 131
1917	10. 008	10. 871	13. 376	13. 159	12. 251	8. 126	67. 791
1918	9. 667	11. 325	10. 622	13. 239	12. 642	8. 429	65. 924
1919	6. 988	8. 345	8. 032	10. 272	10. 579	6. 672	50. 888
1920	8. 745	8. 825	9. 348	12. 479	6. 985	7. 059	53. 441
1921	9. 213	9. 110	9. 129	11. 507	12. 839	8. 815	60. 613
1922	8. 481	8. 460	8. 794	12. 930	11. 671	9. 692	60. 028
1923	5. 950	8. 852	9. 790	10. 374	10. 326	6. 927	52. 219
1924	7. 178	8. 183	11. 562	10. 870	11. 089	7. 427	56. 309
1925	8. 232	8. 167	11. 237	11. 872	8. 100	6. 420	54. 028
1926	5. 398	8. 292	10. 148	9. 981	10. 107	7. 665	51. 591
1927	8. 584	11. 712	10. 369	10. 153	12. 115	7. 058	59. 991
1928	8. 365	7. 437	10. 962	9. 708	7. 170	6. 944	50. 586
1929	7. 334	7. 220	10. 693	9. 277	10. 098	6. 861	51. 483
Mean	7. 911	9. 117	10. 525	11. 161	10. 373	7. 558	56. 645

ROTATION AND TILLAGE EXPERIMENTS

The rotation and tillage experiments at the station are conducted on 196 0.1-acre plots. These plots are 2 by 8 rods in size and are separated by 4-foot alleys on the sides and by 20-foot roadways on the ends. Both the roadways and the alleys are kept clean by cultivation throughout the growing season.

Six of the staple crops—cotton, milo, Kafir, sorgo, corn, and broomcorn—are grown in continuous cropping series under six different methods of seed-bed preparation, including alternation with fallow. The methods of seed-bed preparation studied in these tests are spring plowing, fall plowing, summer fallow, subsoiling, lister planting without previous cultivation and lister planting with previous cultivation. The crops named, and others, are also grown in rotations of varying lengths, involving various combinations of succession and of cultivation.

The average acre yields of each crop for each year on all the plots for the 14 years from 1916 to 1929 are given in Table 3. The results are obtained by averaging the yields of all the plots of each crop for each year. As these results include those from good, bad, and indifferent methods, the average is a good indication of what can be expected from each crop under general farm practices. If only the best methods were employed, the average yields would be materially increased.

TABLE 3.—*Average annual acre yields from all plots in the crop-rotation field at Big Spring, Tex., 1916–1929*

Year	Acre yields of—												
	Milo	Kafir	Feterita	Corn	Wheat	Beans	Cotton (seed cotton)	Broomcorn brush	Peanuts	Sorgo	Sudan grass	Cowpea hay	Millet hay
	Bush.	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
1916	24. 9	19. 6	12. 7	9. 1	3. 1	5. 8	225	354	685	9, 868	6, 160	2, 278	2, 390
1917	8. 3	1. 0	2. 3	. 7	7. 9	1. 3	47	114	68	1, 205	310	168	0
1918	2. 2	0	0	0	0	0	194	67	167	3, 393	1, 540	880	0
1919	50. 1	33. 4	34. 0	16. 0	8. 3	0	1, 178	584	1, 483	12, 548	10, 340	1, 636	3, 860
1920	29. 9	28. 3	19. 0	16. 6	16. 7	7. 5	1, 362	466	1, 485	12, 608	9, 160	3, 122	3, 120
1921	21. 5	16. 3	12. 7	3. 4	3. 9	0	488	268	115	5, 423	3, 880	2, 194	2, 145
1922	25. 3	18. 2	20. 1	6. 2	0	0	597	432	0	7, 043	4, 020	1, 988	1, 565
1923	30. 9	16. 2	14. 3	9. 0	2. 1	0	965	308	0	5, 695	3, 990	1, 592	1, 250
1924	6. 9	7. 0	5. 7	1. 0	3. 9	0	504	168	90	3, 710	2, 610	97	0
1925	15. 6	15. 6	8. 0	5. 2	0	0	777	223	1, 198	5, 800	5, 110	734	540
1926	19. 8	23. 9	23. 6	12. 2	9. 0	0	695	462	1, 177	9, 228	6, 150	1, 361	1, 050
1927	18. 2	12. 4	13. 1	1. 6	1. 6	0	515	253	727	5, 465	2, 355	972	0
1928	28. 7	24. 0	18. 0	14. 0	2. 8	1. 3	980	407	872	8, 188	3, 770	1, 094	0
1929	14. 9	9. 9	8. 2	1. 7	1. 4	4. 7	515	300	713	6, 641	2, 730	1, 204	2, 120
Average	21. 2	16. 1	13. 7	6. 9	4. 3	1. 5	646	315	627	6, 915	4, 438	1, 380	1, 289

COTTON

Cotton is the principal crop of this section, and its acreage has increased about threefold since 1920. Although the rainfall is limited at times, this section's freedom from the boll weevil is an important factor favoring cotton production. Table 4 gives the annual and average acre yields of seed cotton obtained under different cultural methods for the 14 years from 1916 to 1929. The average yields are shown graphically in Figure 6.

TABLE 4.—*Annual and average acre yields of seed cotton produced by different methods at Big Spring, Tex., 1916–1929*

Treatment and previous crop	Number of plots	Acre yields (pounds) in—														
		1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Spring plowed:																
Cotton	1	20	30	270	1, 380	990	310	560	480	243	410	410	90	760	290	446
Milo	3	57	103	160	1, 093	1, 397	490	637	923	594	572	680	570	1, 053	353	620
Cowpeas	3	23	37	123	1, 070	1, 457	470	613	927	465	545	477	487	1, 053	477	587
Total or average	7	37	64	160	1, 124	1, 364	456	616	861	489	538	554	466	1, 011	397	581
Fall plowed:																
Cotton	2	395	35	200	1, 260	1, 470	500	580	1, 085	513	728	835	490	945	475	679
Milo	2	305	10	115	1, 095	1, 470	405	625	850	420	825	535	380	870	270	584
Peanuts	1	720	90	430	850	1, 390	520	670	1, 050	529	800	540	530	850	310	663
Cowpeas	1	450	10	190	990	1, 490	500	520	990	561	1, 160	930	650	950	430	702
Total or average	6	428	32	208	1, 092	1, 460	472	600	985	493	844	702	487	905	372	649
Subsoiled: Cotton	1	400	80	280	1, 520	1, 640	530	610	1, 060	569	930	950	600	1, 050	540	769
Lister planted: Cotton	1	40	10	280	1, 250	920	400	610	800	290	590	300	50	940	310	485
Fall listed:																
Cotton	1	400	90	300	1, 470	1, 290	590	560	1, 140	600	825	780	500	1, 080	600	730
Cowpeas	1	160	10	40	950	1, 180	360	540	860	530	1, 100	1,090	540	1, 050	890	664
Total or average	2	280	50	170	1, 210	1, 235	475	550	1, 000	565	963	935	520	1, 065	745	697
Fallowed	3	223	33	203	1, 313	1, 297	620	567	1, 163	572	1, 090	897	810	987	983	768
Total or average of all plots	20	225	47	194	1, 178	1, 362	488	597	965	504	777	695	515	980	515	646

Cotton occupied 20 plots in various rotations and methods of seedbed preparation. Mebane was the variety planted in these plots except in 1917 and 1918, when Trice and Lone Star were used.

The linting percentage of the Mebane grown on these plots averaged from 38 to 40. The average annual yields of all the plots ranged from 47 pounds of seed cotton in 1917 to 1,362 pounds in 1920. The 14-year average was 646 pounds. The average yield was below the mean in 8 of the 14 years, but there were only 3 years when yields were not fairly good. These were 1916, 1917, and 1918, when extremely dry weather prevailed.

The 14-year average yields produced by the different methods tried ranged from 446 to 769 pounds of seed cotton per acre. The highest yields, 769 and 768 pounds, were obtained respectively from fall-plowed and subsoiled land continuously planted to cotton and from summer fallow. Fall plowing and fall listing generally were done during the first half of December, but the ground was so dry in the fall of 1921 that plowing and listing could not be done until spring. The subsoiled plot was plowed to a depth of 7 inches, as were other fall-plowed plots, and at the same time the other plots were plowed. A narrow-nosed subsoiler was run in the bottom of the furrow to a depth of 10 inches for two years, this treatment omitted for two years, and then repeated. Cotton seems to respond to this treatment.

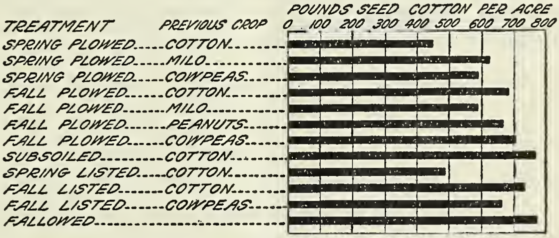

FIGURE 6.—Average acre yields of seed cotton produced by different tillage methods at Big Spring, Tex., 1916–1929

Fallow was one of the treatments producing the highest yields, although these were very little greater than some obtained by following methods under which the land produced a crop each year. Cotton is a late-season crop and does not benefit from fallow as do some of the other crops. One of the fallowed plots was manured, but the manure did not increase the yield.

Fall-plowed land yielded more seed cotton per acre than spring plowed, except when the cotton followed milo. The average yield of all fall-plowed plots except the one subsoiled was 68 pounds more of seed cotton to the acre than the average of all spring-plowed plots, but spring-plowed milo ground averaged 36 pounds more than fall-plowed milo. The lowest yielding treatment under trial was spring plowing and continuous planting to cotton, which had an average of only 446 pounds. Spring plowing was done about April 1.

The second lowest yielding method was continuous lister planting of cotton without previous cultivation. The average yield under this method was 485 pounds per acre.

A plot planted continuously to cotton and listed in the fall averaged 730 pounds to the acre. This was 51 pounds more than the average of two plots plowed in the fall. Following cowpeas in rotations, cotton on fall plowing averaged 38 pounds more than on fall listing and 115 pounds more than on spring plowing.

MILO

Dwarf Yellow milo holds the same position throughout the semiarid section of Texas that corn does in the Corn Belt of the Middle West, that is, it is the principal grain crop grown for feed purposes.

The rotation and cultural experiments with milo include various methods of seed-bed preparation for continuously cropped milo, rotations of different lengths and combinations of crops, and different methods of fallow. Forty-one plots of milo are being studied. A few rotations, including those in which milo is grown after Kafir and wheat, were not established until 1919 and 1920. In the tabulation of results the averages for these methods are for the 10 years from 1920 to 1929. A study of the 10-year averages of all methods shows these averages to be fairly comparable with those for the 14 years.

The annual and average yields produced by the several major methods tried during the 14 years from 1916 to 1929 are given in Table 5. The average yields are shown graphically in Figure 7. In Table 5 and Figure 7 the several methods of listing for continuous milo are grouped together, as are the several methods of fallow. Separate studies of each method are made later.

TABLE 5.—*Annual and average acre yields of milo produced by different methods at Big Spring, Tex., 1916–1929*

Treatment and previous crop	Number of plots	Acre yields (bushels) in—														
		1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Spring plowed:																
Milo	1	18.1	0.3	0	49.1	14.1	7.8	25.3	11.0	2.2	10.0	20.0	5.0	20.3	4.3	13.4
Kafir	[1] 2	----	----	----	42.0	29.7	25.6	22.8	36.2	17.3	14.8	21.3	19.4	41.6	22.1	25.1
Cowpeas	[2] 5	26.7	6.1	4.3	49.8	30.8	14.0	30.5	33.0	4.5	19.1	12.3	15.7	36.1	8.7	20.8
Cotton	1	23.4	0	0	51.0	35.9	5.7	34.7	36.9	2.6	8.8	14.3	10.3	37.1	1.9	18.8
Wheat	[3] 1	----	----	----	----	31.7	11.7	20.2	24.7	0	4.3	4.8	10.2	14.8	2.2	12.5
Total or average	10	24.3	3.7	2.6	47.5	29.5	14.6	27.8	31.0	6.2	14.8	14.3	14.3	33.6	9.6	19.6
Fall plowed:																
Milo	1	18.8	2.8	0	47.4	30.3	24.0	25.5	28.4	5.7	11.0	18.3	17.2	21.4	11.4	18.7
Kafir	[3] 1	----	----	----	----	32.6	14.5	18.6	17.9	2.4	16.9	18.1	10.5	23.3	3.3	15.8
Peanuts	2	34.8	9.3	5.7	40.0	31.5	22.5	23.9	26.3	4.3	17.3	15.3	11.8	25.3	4.0	19.4
Cowpeas	[4] 3	26.5	4.1	.6	39.3	38.5	25.2	29.9	36.7	9.4	28.2	26.7	20.8	28.2	16.4	23.6
Cotton	1	16.4	.3	0	35.0	38.3	15.5	33.4	29.7	1.6	9.1	5.7	10.2	4.3	2.2	14.4
Total or average	8	26.3	5.0	2.1	40.0	35.0	21.8	26.9	29.9	5.8	19.5	19.1	15.5	23.0	9.3	19.9
Subsoiled: Milo	1	34.2	10.9	0	54.8	31.6	17.2	21.0	20.5	0	8.6	14.0	10.5	10.9	4.1	17.0
Listed:																
Milo	9	17.0	1.4	0	44.1	23.6	15.7	15.7	22.5	4.7	8.3	13.8	10.7	18.5	9.0	14.6
Cotton	1	10.0	0	0	32.8	27.9	11.6	19.7	32.8	15.5	26.7	31.9	25.9	25.9	15.3	19.7
Corn	1	15.9	2.8	0	37.1	33.1	23.1	25.3	34.0	3.3	18.8	25.5	20.5	34.3	10.2	20.3
Total or average	11	16.2	1.4	0	42.4	24.8	16.0	16.9	24.5	5.5	10.9	16.5	13.0	20.6	9.7	15.6
Cowpeas, green manure	1	14.1	3.6	5.0	47.8	30.5	26.7	27.6	44.7	19.1	21.6	31.9	33.8	37.8	19.8	26.0
Fallowed	[5] 10	35.1	21.6	4.8	66.3	31.6	34.1	31.1	38.5	9.5	18.6	28.7	29.1	38.1	31.2	29.9
Total or average of all plots	41	24.9	8.3	2.2	50.1	29.9	21.5	25.3	30.9	6.9	15.6	19.8	18.2	28.7	14.9	21.2

[1] Started in 1919; 3 plots that year. Average is for 10 years from 1920.
[2] Only 3 plots before 1919.
[3] Started in 1920.
[4] Only 2 plots before 1919.
[5] 9 plots from 1916 to 1918; 11 plots in 1919.

The 14-year average yield of all plots under all methods was 21.2 bushels, or 1,230 pounds, of threshed grain to the acre, the yields being calculated at 58 pounds to the bushel.

The average per acre of all fall-plowed plots was only 0.3 bushel more than the average of all spring-plowed plots. Milo following cowpeas and milo continuously cropped produced, respectively, 2.8 and 5.3 bushels more per acre on fall plowing than on spring plowing. The results with these methods, however, were reversed where milo followed cotton and Kafir. The yields of milo following these crops were, respectively, 4.4 and 9.3 bushels per acre more on spring plowing than on fall plowing.

Although the fact is not shown by Table 5, in the rotations fall listing produced as well as fall plowing. In view of the fact that listing is much cheaper than plowing and also aids in preventing soil blowing, it is a very desirable method of preparation under most farm conditions.

Subsoiling in addition to fall plowing has produced yields slightly lower than those obtained from fall plowing to ordinary depths.

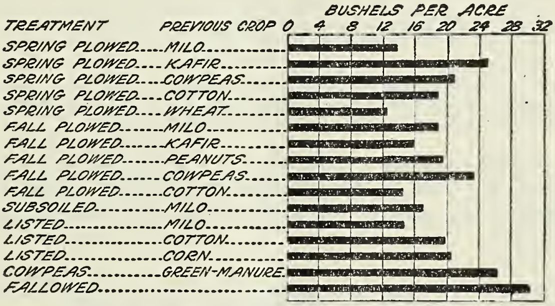

FIGURE 7.—Average acre yields of milo produced by different tillage methods at Big Spring, Tex., 1916–1929

The average yield of 10 plots fallowed by various methods was 29.9 bushels of grain per acre, which was 8.7 bushels more than the average for all methods and about 10 bushels more than from land cropped the previous year and plowed in either fall or spring. Milo following cowpeas plowed under for green manure produced 26 bushels, or 3.9 bushels less than the average of all fallow plots.

Certain pairs of plots in this experiment were alternately fallowed and cropped to milo. Four methods of fallowing, varying in the time of beginning cultivation of the fallow and in the amount of work expended on it, were under trial and productive of results for the 13 years from 1917 to 1929. These four treatments used were: (1) The fallow plot was plowed in the fall, replowed about July 1 of the fallow year, and kept free from weeds during the remainder of the season (the most intensive method); (2) the fallow plot was plowed in the fall and kept clean cultivated during the following season; (3) the fallow plot was plowed about May 1 of the fallow season and then kept clean cultivated, the standard method of fallow in the rotations; (4) the fallow plot was not plowed until about July 1 and then was given a minimum of cultivation to keep it clean.

The 13-year average yields produced by the four methods were, respectively, 34.3, 35.9, 30.9, and 26.3 bushels per acre. They were very consistent in maintaining about the same relative positions from year to year.

The highest yields were from the two methods in which the land was plowed in the fall. Of these two, the one requiring the less work was slightly the better; no advantage was gained by replowing. The spring-plowed fallow averaged 5 bushels less than the fall plowed and 4.6 bushels more than where plowing was delayed until about July 1. When plowing is done so late, weeds have used so much water from the soil that the purpose of the fallow, to conserve and store water in the soil, is to a large extent defeated.

The results indicate clearly that plowing for fallow should be done in the fall, winter, or spring, as determined by soil-moisture conditions and the danger of soil blowing.

A trial of seven methods of preparing with a lister a seed bed on land continuously cropped to milo has been conducted for the 14 years from 1916 to 1929. The methods were as follows:

Plot R.—Fall disk, winter list, level in spring, lister plant in furrows.
Plot S.—Fall list, level in winter, lister plant in furrows.
Plot T.—Fall list, level in spring, lister plant in furrows.
Plot U.—Fall list, harrow in spring, lister plant, splitting ridges.
Plot V.—Fall list, lister plant, splitting ridges.
Plot W.—Early spring list, plant in furrows without cultivation.
Plot X.—Early spring list, lister plant, splitting ridges.

The annual and average yields of this experiment are given in Table 6. In general, the fall or winter listing methods with cultivation to control weeds in the spring have given better results than listing in the spring.

Table 6.—*Annual and average acre yields of milo produced by different methods of listing at Big Spring, Tex., 1916–1929*

Plot	Acre yields (bushels) in—														
	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
R	21.6	2.3	0	64.5	32.8	22.9	31.0	30.6	7.6	8.4	15.2	13.1	16.2	6.6	19.5
S	22.4	1.2	0	58.1	33.8	19.5	23.3	26.7	5.2	8.1	12.1	11.0	17.8	8.3	17.7
T	17.6	0	0	48.4	27.8	15.9	22.9	28.1	10.5	9.3	14.3	11.2	17.4	8.8	16.6
U	10.5	0	0	35.7	23.4	20.0	17.4	30.3	9.5	9.0	14.8	15.0	25.5	17.1	16.3
V	15.9	1.0	0	33.6	22.1	17.4	10.0	28.6	4.7	10.5	15.7	14.7	24.1	12.9	15.1
W	14.6	1.6	0	35.7	23.4	12.1	13.4	22.8	3.4	9.0	15.2	11.9	24.0	12.8	14.3
X	14.6	0	0	33.4	18.3	15.2	9.5	15.9	1.0	7.1	15.2	7.4	16.9	7.1	11.5

The highest 14-year average yield, 19.5 bushels, was from plot R, which was fall disked, winter listed, leveled in the spring, and lister planted in the furrows of the first listing. This method helps to control soil blowing in late winter or early spring and keeps the surface in a condition favorable to receive and retain precipitation.

The next highest yield, 17.7 bushels, was from plot S, in which fall listing and winter leveling took the place of the fall disking, winter listing, and spring leveling practiced on plot R. Plot T received no winter cultivation. Its average yield was not quite so high as those that did, but the relative performance of these plots in individual years indicates that this difference may not be significant. Plot U differed from plot T in two particulars: It was (1) harrowed instead of leveled in the spring and (2) planted by splitting the ridges. There was no significant difference between the yields of these two plots. Plot V did not receive the winter or spring cultivation, and its yield fell to 15.1 bushels, which was the lowest for any plot on which cultivation started in the fall.

The two plots, W and X, on which cultivation started with early spring listing, yielded less than any of the five plots on which cultivation started in the fall. One was planted in the furrows and the other by splitting the ridges. The yield from the latter was much the lower. Later work which has been started to check this comparison tends to confirm the desirability of planting milo in the furrows of the first listing instead of splitting the ridges. These results, however, are somewhat contrary to those obtained at some other stations and with other crops at this station.

KAFIR

Kafir ranks next to milo among the grain sorghums of this section. This position is well merited, for, in addition to producing a yield of grain nearly equal to that of milo, the stover has considerable feeding value as roughage.

Six plots have been devoted to continuously cropped Kafir with different methods of seed-bed preparation for the 14 years from 1916 to 1929, and from 1919 or 1920 to 1929 nine additional plots in various rotations have been under test. The results of this test in bushels of grain per acre are shown in Table 7. The 10-year averages, from 1920 to 1929, are presented graphically in Figure 8. Kafir is computed at 60 pounds to the bushel.

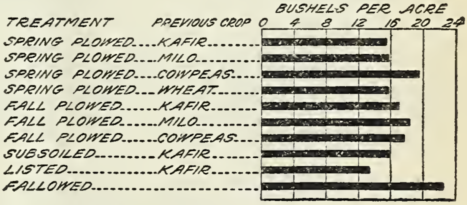

FIGURE 8.—Average acre yields of Kafir produced by different tillage methods at Big Spring, Tex., 1920–1929

The 14-year mean of the average annual yields of Kafir is 16.1 bushels of grain to the acre, and the 10-year mean is 17.2 bushels.

In both the 10-year and the 14-year means fall plowing has given an increased yield of grain and stover over spring plowing. This increase averaged 1 bushel for the 10-year period and 1.2 bushels for the 14 years. It was rather consistent in both the continuously cropped and the rotation plots, except following cowpeas, where the spring plowing gave the higher yield.

A subsoiled plot averaged only 0.3 bushel more for 14 years than a comparable plot that was plowed at the same time each fall but not subsoiled. Two listed plots averaged only 13.3 bushels, and a comparable plot that was spring plowed and surface planted averaged 14.4 bushels over the 14 years.

Two plots on fallow averaged 20.8 bushels for the 14-year period. During the same period Kafir following Kafir averaged 16.1 bushels on fall plowing and 14.3 bushels on spring plowing.

For the 10-year period Kafir following other crops in rotation approached still more closely the yield on fallow.

TABLE 7.—*Annual and average acre yields of Kafir produced by different methods at Big Spring, Tex., 1916–1929*

Treatment and previous crop	Number of plots	Acre yields (bushels) in—															
		1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average 1916 to 1929	Average 1920 to 1929
Spring plowed:																	
Kafir	[1] 2	13.3	0	0	33.0	29.9	16.9	17.3	12.4	5.7	13.7	19.2	11.2	22.9	5.3	14.3	15.5
Milo	2	----	----	----	28.4	32.9	7.2	19.6	17.7	4.0	10.3	29.5	7.7	25.7	3.2	----	15.8
Cowpeas	[2] 2	----	----	----	31.1	29.8	17.2	19.8	19.5	8.6	18.5	22.2	17.3	28.6	14.4	----	19.6
Wheat	1	----	----	----	----	22.8	15.8	21.5	18.0	5.0	10.0	21.0	10.5	25.7	6.5	----	15.7
Total or average	7	13.3	0	0	30.8	29.7	14.0	19.3	16.7	5.9	13.5	23.2	11.8	25.7	7.5	15.1	16.7
Fall plowed:																	
Kafir	1	11.2	0	0	45.0	31.5	20.7	18.7	13.8	7.7	15.3	23.3	11.0	19.8	7.5	16.1	16.9
Milo	1	----	----	----	36.5	34.3	17.5	16.8	17.7	6.7	20.3	26.8	14.2	26.0	3.0	----	18.3
Cowpeas	1	----	----	----	----	33.8	15.8	16.2	16.8	6.0	31.2	16.0	12.5	22.3	6.8	----	17.7
Total or average	3	11.2	0	0	40.8	33.2	18.0	17.2	16.1	6.8	22.3	22.0	12.6	22.7	5.8	16.3	17.7
Subsoiled: Kafir	1	22.8	.3	0	45.8	27.5	21.3	21.7	13.2	7.2	12.7	21.7	9.8	18.8	7.2	16.4	16.1
Listed: Kafir	2	21.0	.4	0	30.8	17.6	12.2	15.9	15.5	7.5	9.5	20.3	9.0	18.2	7.8	13.3	13.4
Fallowed	[3] 2	28.5	4.7	0	32.2	27.2	23.3	16.8	16.9	10.4	20.4	34.1	19.2	28.5	28.4	20.8	22.5
Total or average of all plots [4]	15	19.6	1.0	0	33.4	28.3	16.3	18.2	16.2	7.0	15.6	23.9	12.4	24.0	9.9	16.1	17.2

[1] Only one plot before 1919.
[2] Three plots in 1919.
[3] One plot from 1916 to 1918 and three plots in 1919.
[4] Only six plots before 1919.

CORN

Corn of the Mexican June variety was grown on nine plots in continuous cropping and rotation experiments from 1916 to 1929, inclusive. The annual and average yields of grain for the 14 years are given in Table 8.

TABLE 8.—*Annual and average acre yields of ear corn produced by different methods at Big Spring, Tex., 1916–1929*

Treatment and previous crop	Number of plots averaged	Acre yields (bushels) in—														
		1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Spring plowed: Corn	1	4.3	0	0	12.9	4.4	0	8.3	3.4	0	0.3	2.4	0	7.3	0	3.1
Fall plowed:																
Corn	1	14.1	.7	0	17.0	20.9	4.6	7.9	11.9	1.6	5.7	12.7	1.6	15.0	1.1	8.2
Beans	1	15.3	1.7	0	20.9	23.3	6.1	8.1	13.3	1.0	16.7	28.6	2.3	16.7	1.1	11.1
Total or average	2	14.7	1.2	0	19.0	22.1	5.4	8.0	12.6	1.3	11.2	20.7	2.0	15.9	1.1	9.7
Subsoiled: Corn	1	11.1	.5	0	19.6	22.1	7.4	8.4	14.3	1.4	6.7	21.7	3.4	21.4	3.7	10.1
Listed:																
Corn	2	1.3	0	0	6.7	9.5	0	2.7	4.2	.4	.2	4.1	0	12.2	0	3.0
Beans	1	11.2	.7	0	16.4	21.1	2.9	5.7	----	----	----	----	----	----	----	------
Sudan grass	[1] 1	----	----	----	----	----	----	----	6.4	0	.7	3.3	0	10.1	0	------
Total or average	3	4.6	.2	0	9.9	13.4	1.0	3.7	4.9	.2	.3	3.8	0	11.5	0	3.8
Green manured: Cowpeas	1	11.3	1.1	0	22.1	15.9	3.6	3.6	9.7	2.7	10.3	10.7	4.1	10.9	0	7.6
Summer-fallowed	1	11.9	1.6	0	21.4	22.9	5.8	8.6	13.9	1.7	5.9	22.1	3.4	20.4	9.6	10.7
Total or average of all plots	9	9.1	.7	0	16.0	16.6	3.4	6.2	9.0	1.0	5.2	12.2	1.6	14.0	1.7	6.9

[1] Sudan grass replaced beans in 1923 and succeeding years.

Fall plowing following beans gave the highest average yield, 11.1 bushels per acre. This method also gave the highest average yield of stover, 2,373 pounds. The yield was due partly to the fact that the bean crop was a failure during several years of the test. The next highest yields were on fallow, 10.7 bushels, and subsoiled continuously cropped corn, 10.1 bushels. Fall-plowed continuously cropped corn averaged 8.2 bushels; spring-plowed continuous corn, 3.1 bushels; listed continuous corn, 3 bushels; and corn after cowpeas as green manure, 7.6 bushels. One of the listed plots was planted with a lister without previous cultivation, and the other received an average of two cultivations before planting. The average yields of the two were the same. The 14-year average yield of all plots was 6.9 bushels of grain and 1,693 pounds of stover.

Returning such yields as these, corn can not compete with the grain sorghums for a place in the agriculture of this section. It does not possess the drought-resistant qualities of the grain sorghums and can not withstand the hot winds and dry periods to which it is subjected

BROOMCORN

Broomcorn of the Dwarf Acme variety occupied six plots, five continuously cropped to broomcorn by different cultural methods and the sixth on fallow. The yields were based on the total quantity of brush harvested. The annual and average acre yields produced by the different methods during the 14 years from 1916 to 1929 are given in Table 9. The average yield of the six plots was 315 pounds of brush to the acre. Broomcorn following fallow ranked first with 457 pounds of brush to the acre; fall plowing yielded 357 pounds, and fall plowing and subsoiling 355 pounds. Two listed plots averaged 253 pounds and one spring-plowed plot averaged 213 pounds.

TABLE 9.—*Annual and average acre yields of broomcorn brush produced by different methods at Big Spring, Tex., 1916–1929*

Treatment and previous crop	Number of plots	Acre yields (pounds) in—														
		1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Spring plowed: Broomcorn	1	325	0	0	750	190	30	390	140	50	50	170	200	430	260	213
Fall plowed: Broomcorn	1	475	220	0	600	630	350	400	390	190	330	530	190	450	240	357
Subsoiled: Broomcorn	1	515	175	0	580	650	360	430	320	150	290	610	190	430	270	355
Listed: Broomcorn	2	105	15	30	448	298	210	470	285	235	135	425	285	315	290	253
Fallowed	1	600	260	340	680	730	450	430	430	150	400	610	370	500	450	457
Total or average	6	354	114	67	584	466	268	432	308	168	223	462	253	407	300	315

Broomcorn has never been included in the farming system of this section, but the yields obtained by the better methods are such that it might well be used to a limited extent in the rotations.

COWPEAS

Cowpeas were represented by 22 plots in various 2-year to 4-year rotations from 1919 to 1929, inclusive. These plots included 13 from 1916 to 1929, inclusive. The yields of cowpeas from the different cultural treatments are given in Table 10.

TABLE 10.—*Annual and average acre yields of cowpea hay produced by different methods at Big Spring, Tex., 1916–1929*

Treatment and previous crop	Number of plots	Acre yields (pounds) in—														
		1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Spring plowed:																
Milo	[1] 6	2,050	80	727	1,740	3,355	2,183	2,057	1,703	187	447	1,107	958	1,143	1,253	1.356
Kafir	3	------	------	------	1,633	2,787	1,927	1,907	1,433	73	393	1,227	900	1,090	1,073	[2] 1,313
Cotton	3	2,467	283	1,460	1,480	3,667	2,200	2,187	1,633	67	727	1,440	947	1,213	1,147	1,494
Millet	1	2,450	80	480	1,660	2,860	2,300	1,760	1,560	0	500	1,040	960	1,080	1,260	1,285
Winter wheat	1	------	------	------	1,660	2,760	1,400	1,800	1,520	0	320	1,040	960	1,000	960	[2] 1,220
Total or average	14	2,286	167	1,006	1,656	3,222	2,084	2,013	1,607	110	490	1,194	944	1,132	1,171	1,363
Fall plowed:																
Milo	[3] 2	2,200	150	940	1,420	2,990	2,360	2,210	1,390	0	1,330	1,720	1,090	940	1,330	1,434
Kafir	1	------	------	------	1,880	2,740	2,260	2,100	1,540	160	860	1,320	900	880	1,040	[2] 1,425
Cotton	2	2,255	125	570	1,660	3,020	2,510	1,960	1,640	90	1,280	1,740	900	1,120	1,320	1,442
Peanuts	1	2,300	530	860	1,740	2,920	2,180	2,060	1,620	0	1,360	1,820	860	1,220	1,300	1,484
Millet	1	3,000	90	880	1,500	3,600	3,000	1,820	1,760	0	720	1,240	1,340	1,100	1,320	1,526
Total or average	7	2,402	204	764	1,643	3,040	2,454	2,046	1,569	49	1,166	1,614	1,011	1,046	1,280	1,449
Listed: Milo	1	1,600	0	580	1,300	2,300	1,900	1,240	1,540	260	1,120	1,920	1,100	900	1.120	1,206
Total or average of all plots	[4] 22	2,278	168	880	1,636	3,122	2,194	1,988	1,592	97	734	1,361	972	1,094	1,204	1,380

[1] Only 3 plots in 1916, 1917, and 1918; 7 plots in 1919.

[2] Averages for 11 years.

[3] Only 1 plot before 1920.

[4] Only 13 plots before 1919.

The 14-year average yield under all methods was 1,380 pounds. The yield was very low in two years of this period. In about one-half of the years the average yield was more than three-quarters of a ton of hay, the highest average being more than 1½ tons in 1920. The highest yields were obtained on fall plowing following millet, which generally produced little or nothing; on spring plowing following cotton, which is a standard crop; and on fall plowing following peanuts. The yield on fall plowing following cotton was also high.

The Whippoorwill variety of cowpeas was used in this test, and a fine quality of hay was obtained. Other varieties yield more hay to the acre, but their vines are so coarse that they are difficult to cure properly.

This is one of the few legumes used here in rotation with other crops. With the development of livestock farming in this section, cowpeas should become more popular as a hay crop.

SORGO

Sumac sorgo occupied eight plots in the tillage and rotation experiments. The results of these tests are presented in Table 11. Sumac, or Red Top sorgo, as it is commonly called, is the most popular forage or hay crop grown in this section.

TABLE 11.—*Annual and average acre yields of sorgo produced by different methods at Big Spring, Tex., 1916–1929*

Treatment and previous crop	Number of plots	Acre yields (pounds) in—							
		1916	1917	1918	1919	1920	1921	1922	1923
Spring plowed:									
Sorgo	1	9, 320	1, 540	5, 940	12, 900	10, 980	2, 900	6, 890	2, 220
Cowpeas	1	6, 800	565	900	11, 680	13, 600	3, 400	8, 600	7, 140
Total or average	2	8, 060	1, 053	3, 420	12, 290	12, 290	3, 150	7, 745	4, 680
Fall plowed:									
Sorgo	1	12, 520	2, 860	5, 100	13, 500	13, 440	4, 780	8, 400	6, 400
Cowpeas	1	14, 320	250	1, 740	12, 840	14, 120	6, 240	9, 640	8, 700
Total or average	2	13, 420	1, 555	3, 420	13, 170	13, 780	5, 510	9, 020	7, 550
Subsoiled: Sorgo	1	10, 480	765	1, 640	11, 120	13, 500	6, 760	6, 440	7, 000
Listed: Sorgo	2	4, 670	210	1, 140	11, 070	10, 660	3, 930	3, 520	3, 050
Summer-fallowed	1	16, 160	3, 240	9, 540	16, 200	13, 900	11, 440	9, 330	8, 000
Total or average of all plots	8	9, 868	1, 205	3, 393	12, 548	12, 608	5, 423	7, 043	5, 695

Treatment and previous crop	Number of plots	Acre yields (pounds) in—						
		1924	1925	1926	1927	1928	1929	Average
Spring plowed:								
Sorgo	1	2, 160	4, 280	7, 500	2, 580	6, 640	4, 400	5, 732
Cowpeas	1	4, 690	6, 700	6, 320	6, 500	10, 760	5, 660	6, 665
Total or average	2	3, 425	5, 490	6, 910	4, 540	8, 700	5, 030	6, 199
Fall plowed:								
Sorgo	1	3, 380	4, 920	8, 120	4, 420	6, 100	6, 800	7, 196
Cowpeas	1	5, 140	12, 500	11, 400	7, 340	11, 940	7, 600	8, 841
Total or average	2	4, 260	8, 710	9, 760	5, 880	9, 020	7, 200	8, 018
Subsoiled: Sorgo	1	3, 600	4, 580	8, 700	5, 200	6, 880	6, 100	6, 626
Listed: Sorgo	2	2, 795	3, 770	9, 620	4, 140	6, 980	4, 350	4, 993
Summer-fallowed	1	5, 120	5, 880	12, 540	9, 400	9, 220	12, 200	10, 155
Total or average of all plots	8	3, 710	5, 800	9, 228	5, 465	8, 188	6, 433	6, 900

The average acre yield of all the plots for the 14 years from 1916 to 1929 was 6,900 pounds of cured fodder to the acre. The highest yield, 10,155 pounds, was obtained from summer-fallowed land, but the increase through fallow over yields under other good methods was not great enough to warrant fallowing for sorgo.

The average of the two fall-plowed plots was 8,018 pounds to the acre, as compared with 6,199 pounds to the acre for the two spring-plowed plots. Sorgo did not respond to subsoiling, under which the yield was not so high as on the fall-plowed plots. The lowest yield was from listing.

PEANUTS

The soil and climatic conditions of this section are very favorable for the production of peanuts. Satisfactory yields of this crop can be produced, but the land is left so bare of vegetation after harvest that winds during the following winter do considerable soil blowing. This can be overcome by cultivation.

Six plots in as many rotations are devoted to peanuts. The annual and average acre yields for the 14 years from 1916 to 1929 are shown in Table 12. Fall plowing following cowpeas produced 791 pounds of nuts and 2,613 pounds of hay per acre. This was the highest yield. The lowest yield of nuts, 488 pounds, and the second lowest yield of hay, 1,918 pounds to the acre, were obtained on fall plowing following Sudan grass.

TABLE 12.—*Annual and average acre yields of peanuts produced by different methods at Big Spring, Tex., 1916–1929*

NUTS

Treatment and previous crop	Number of plots	Acre yields (pounds) in—														
		1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Fall plowed:																
Sudan grass	1	700	230	80	1,140	930	75	0	0	50	640	1,230	300	960	490	488
Corn	1	790	110	340	1,190	1,720	210	0	0	80	1,360	1,100	920	920	820	683
Cotton	1	820	10	170	1,640	1,880	160	0	0	150	1,250	1,100	720	730	530	654
Cowpeas	1	790	55	80	1,470	1,520	100	0	0	100	1,870	1,750	1,160	980	1,200	791
Milo	1	320	0	30	1,850	1,190	95	0	0	120	1,070	840	700	700	730	546
Total or average	5	684	81	140	1,458	1,448	128	0	0	100	1,238	1,204	760	858	754	632
Listed: Corn	1	690	0	300	1,610	1,670	50	0	0	40	1,000	1,040	560	940	510	601
Total or average of all plots	6	685	68	167	1,483	1,485	115	0	0	90	1,198	1,177	727	872	713	627

TABLE 12.—*Annual and average acre yields of peanuts produced by different methods at Big Spring, Tex., 1916–1929*—Continued

HAY

Treatment and previous crop	Number of plots	Acre yields (pounds) in—							
		1916	1917	1918	1919	1920	1921	1922	1923
Fall plowed:									
Sudan grass	1	2, 100	245	760	8, 200	3, 070	1, 625	1, 530	0
Corn	1	1, 810	325	1, 730	6, 350	4, 480	1, 930	780	0
Cotton	1	2, 160	245	1, 780	8, 960	4, 620	2, 220	0	1, 600
Cowpeas	1	2, 030	180	1, 570	8, 830	4, 380	1, 540	0	820
Milo	1	840	48	1, 070	6, 900	3, 670	1, 875	0	1, 240
Total or average	5	1, 788	209	1, 382	7, 848	4, 044	1, 838	462	732
Listed: Corn	1	1, 970	95	2, 230	9. 090	4, 330	1, 830	1, 500	220
Total or average of all plots	6	1, 818	190	1, 523	8, 055	4, 092	1, 837	635	647

Treatment and previous crop	Number of plots	Acre yields (pounds) in—						
		1924	1925	1926	1927	1928	1929	Average
Fall plowed:								
Sudan grass	1	280	3, 400	1, 730	700	1, 580	1, 630	1, 918
Corn	1	440	3, 430	4, 000	2, 080	1, 080	2, 380	2, 201
Cotton	1	720	3, 400	2, 260	1, 610	1, 370	1, 970	2, 351
Cowpeas	1	730	4, 230	5, 370	2, 180	1, 420	3, 300	2, 613
Milo	1	500	2, 430	2, 360	1, 300	1, 100	1, 890	1, 802
Total or average	5	534	3, 378	3, 144	1, 574	1, 310	2, 234	2, 177
Listed: Corn	1	460	3, 550	3, 300	1, 280	1, 360	1, 590	2, 348
Total or average of all plots	6	522	3, 407	3, 180	1, 525	1, 318	2, 127	2, 205

FETERITA

Feterita has been grown for the 14 years from 1916 to 1929 on spring plowing following feterita, fall plowing following feterita, and fallow. The annual and average yields of these methods are given in Table 13. Spring plowing averaged 8.8 bushels, fall plowing 13.5 bushels, and fallow 18.8 bushels to the acre. These yields are much below those of milo and Kafir.

TABLE 13.—*Annual and average acre yields of feterita produced by different methods at Big Spring, Tex., 1916–1929*

Treatment and previous crop	Number of plots	Acre yields (bushels) in—														
		1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Spring plowed: Feterita	1	7. 1	0	0	30. 0	8. 3	3. 6	19. 5	6. 6	2. 6	4. 0	17. 4	6. 7	14. 1	2. 8	8. 8
Fall plowed: Feterita	1	8. 1	0	0	34. 5	25. 3	14. 7	19. 5	15. 7	4. 7	7. 1	25. 0	11. 7	16. 0	6. 2	13. 5
Fallow	1	22. 8	7. 0	0	37. 6	23. 3	19. 7	21. 4	20. 7	9. 8	12. 8	28. 4	20. 9	23. 8	15. 5	18. 8
Total or average	3	12. 7	2. 3	0	34. 0	19. 0	12. 7	20. 1	14. 3	5. 7	8. 0	23. 6	13. 1	18. 0	8. 2	13. 7

The feterita plots are the first ones to mature in the rotation field, and birds take a considerable amount of grain from them every year. This has lowered the average yield of grain considerably.

However, feterita as an early-maturing sorghum has a place in the farming scheme of this section. In years when normal plantings of milo and Kafir are lost too late to replant them, feterita can be used successfully as a feed crop and may often be the only available feed crop.

WINTER WHEAT

Winter wheat occupied 10 plots in the tillage and rotation experiments from 1919 to 1929, inclusive. This included 6 plots from 1917 to 1929, inclusive. The annual and average yields for the 13 years from 1917 to 1929, inclusive, are given in Table 14. The 13-year mean of the average annual acre yields was only 4.4 bushels to the acre. The treatment producing the highest yield during the 13-year period averaged only 5.1 bushels to the acre. The highest yields during this period were from listed and subsoiled plots continuously cropped to wheat. Listing and subsoiling were done at the same time as early plowing. During the 11 years it was under trial, disking land following cowpeas was one of the best methods of preparation. All these yields were higher than those produced on land that was plowed. The low yields indicate very clearly that wheat is not a profitable crop in this section of the country.

TABLE 14.—*Annual and average acre yields of winter wheat produced by different methods at Big Spring, Tex., 1917–1929*

Treatment and previous crop	Number of plots	Acre yields (bushels) in—													
		1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Disked: Cowpeas	[1] 3	----	----	2.4	17.4	6.2	0	3.2	6.3	0	13.1	1.4	4.0	1.9	5.1
Late plowed: Wheat	[2] 1	5.8	0	2.3	12.8	3.9	0	1.3	1.0	0	3.5	.8	.7	0	2.5
Early plowed: Wheat	[3] 2	7.2	0	1.7	16.5	1.8	0	1.8	2.9	0	8.8	2.4	1.8	1.3	3.6
Subsoiled: Wheat	1	10.3	0	21.3	18.8	.8	0	1.5	2.5	0	4.8	.8	4.0	1.0	5.1
Listed: Wheat	2	8.6	0	16.6	19.8	2.0	0	1.5	2.2	0	7.3	2.2	3.0	.5	4.9
Fallow	[4] 1	7.2	0	8.7	14.3	5.8	0	2.0	6.2	0	9.7	.8	1.5	4.0	4.6
Total or average	[5] 10	7.9	0	8.3	16.7	3.9	0	2.1	3.9	0	9.0	1.6	2.8	1.4	4.4

[1] Not started until 1919. Average is for 11 years.
[2] Two plots in 1920 and 1921.
[3] Only one plot before 1922.
[4] Two plots in 1919.
[5] Only six plots in 1917 and 1918.

COOPERATIVE EXPERIMENTS WITH FIELD CROPS

Experiments in cooperation with three divisions of the Bureau of Plant Industry are going forward at the Big Spring station with the purpose of discovering the best kinds and varieties of crops and the proper times and best rates at which to plant these crops. The divisions engaged in these cooperative experiments are those of Cotton, Rubber, and Other Tropical Plants; Cereal Crops and Diseases; and Forage Crops and Diseases.

COTTON

Experiments with cotton have included varietal tests, date-of-seeding tests, and rate-of-seeding tests. The yields have been determined in terms of seed cotton. Ginning tests to determine the linting percentages were made from 1923 to 1929, inclusive.

VARIETAL EXPERIMENTS

Varietal tests of cotton have been conducted since 1915. The principal test has included the varieties generally grown in this vicinity and others that have been introduced from other sections. The list of varieties under trial has been changed from time to time by adding new ones and dropping old ones. In 1916 the varietal test was applied to the Rowden variety on a single 0.1-acre plot and to five other varieties on plots of the same size replicated five times. From 1918 to 1924, inclusive, the varieties were grown on duplicated or triplicated 0.1-acre plots. From 1925 to 1929, inclusive, the varieties were grown in duplicated 0.04-acre plots, each plot consisting of four rows. The yield of each row was determined separately. The annual and average acre yields for a 6-year and an 11-year period of this test are given in Table 15. The yields are given in pounds of seed cotton per acre. The linting percentage was determined from 1923 to 1929, inclusive. The linting percentages of the varieties under trial in those years are given in Table 16. The averages range from 32.5 per cent for Trice to 43 per cent for Half and Half.

TABLE 15.—*Annual and average acre yields of seed cotton grown in varietal experiments at Big Spring, Tex., 1915–1929*

Variety	Acre yields (pounds) in—															Average	
	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1924 to 1929	1919 to 1929
Trice	1,341	406	----	----	633	1,715	705	638	[1] 973	558	460	747	772	1,052	783	729	821
Lone Star	1,194	482	----	93	1,137	1,730	685	788	995	772	653	628	992	1,029	734	801	922
Durango	1,401	456	0	120	1,137	1,760	895	706	1,096	----	----	----	----	----	----	----	----
Columbia	1,880	470	0	----	527	1,881	580	725	----	----	----	----	----	----	----	----	----
Holden	974	257	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Rowden	----	600	0	----	----	----	----	----	----	749	618	735	785	1,044	703	772	----
Acala	----	----	0	115	937	1,560	780	700	1,192	711	614	754	774	1,098	762	786	898
Mebane	----	----	0	113	723	1,765	700	900	1,146	783	651	716	895	959	747	792	908
Burnett	----	----	----	----	----	----	----	----	1,135	679	599	716	821	952	844	769	----
Kasch	----	----	----	----	----	----	----	----	1,146	623	608	725	834	888	739	736	----
Oklahoma 44	----	----	----	----	----	----	----	----	----	641	585	869	793	1,109	820	803	----
Half and Half	----	----	----	----	----	----	----	----	----	670	547	900	974	1,064	838	832	----
Salsbury	----	----	----	----	----	----	----	----	----	639	646	782	804	----	----	----	----
Bennett	----	----	----	----	----	----	----	----	----	----	----	560	871	949	764	----	----
Lightning Express	----	----	----	----	----	----	----	----	----	----	----	669	771	1,041	773	----	----
Lankart	----	----	----	----	----	----	----	----	----	----	----	----	----	920	722	----	----
Wacona	----	----	----	----	----	----	----	----	----	----	----	----	----	1,049	718	----	----

[1] Interpolated from ratio with Lone Star and Acala from 1919 to 1929.

TABLE 16.—*Linting percentages of varieties of cotton at Big Spring, Tex., 1923–1929*

Variety	1923	1924	1925	1926	1927	1928	1929	Average
Acala	37.5	39.0	34.0	35.9	36.7	34.7	37.3	36.4
Mebane	40.8	38.0	37.2	39.2	37.0	40.5	40.9	39.1
Rowden	34.8	34.0	35.4	36.4	32.0	35.4	39.9	35.4
Lone Star	36.4	35.0	35.2	39.0	33.9	38.3	38.3	36.6
Oklahoma 44	38.5	35.0	37.2	35.8	34.5	35.5	36.1	36.1
Trice	35.0	31.0	33.8	31.2	31.4	32.5	32.7	32.5
Burnett	33.3	32.0	34.7	33.6	32.6	33.8	32.1	33.2
Half and Half	44.1	40.0	40.3	44.6	44.4	42.0	45.3	43.0
Kasch	40.5	40.0	38.0	41.0	37.1	40.4	47.9	40.7
Bennett	----	----	----	38.8	33.8	37.7	39.4	37.4
Lightning Express	----	----	----	31.0	29.3	34.2	39.9	33.6
Lankart	----	----	----	----	----	39.3	40.9	40.1
Wacona	----	----	----	----	----	37.7	40.7	39.2

Only four varieties are included in the averages for the 11 years from 1919 to 1929. (Table 15.) There is a difference of only 24 pounds of seed cotton in the averages of the three leading varieties for this period. The average yields were: Lone Star, 922 pounds; Mebane, 908 pounds; Acala, 898 pounds; and Trice, 821 pounds. The higher linting percentage of Mebane (Table 16) gives it a slight advantage in yield of lint per acre. It is also more nearly storm-proof than the others. These characteristics make it a highly desirable variety for this section.

The 6-year averages, for the years 1924 to 1929, inclusive, cover the same four varieties and five others. (Table 15.) The relative standing of the four varieties is the same as for the longer period. Half and Half averaged 40 pounds more seed cotton than Mebane for this period, but it has a much shorter staple, which is an undesirable feature.

Additional comparisons were made in 1924 and 1925 between Acala and Mebane on plots replicated four times. In 1924 each plot was harvested in two parts. The average yields in these tests were: In 1924, Acala 586 pounds and Mebane 700 pounds; and in 1925, Acala 523 pounds and Mebane 540 pounds.

During the 15 years from 1915 to 1929 more than 100 varieties and strains have been grown in single rows. These are primarily for observation rather than for quantitative results, but the yields are determined and calculated as from 0.01-acre plots. The results of these tests are not reported in this publication.

DATE-OF-PLANTING EXPERIMENTS

The first date-of-planting test was with Lone Star in 1919. Six plantings were made at approximately 10-day intervals from April 15 to June 6. No stand was obtained from the June 6 planting, because it was washed out by a heavy rain soon after planting. The stands from plantings made on some of the other dates were poor. The distances between plants and the yields of seed cotton from plantings made on the several dates were as follows:

	Inches	Pounds
April 15	12	1, 383
April 25	24	1, 208
May 5	57	607
May 15	13	1, 410
May 26	26	675

It was planned to repeat the experiment in 1920, but on account of dry weather only one planting was made. This was on June 1 and yielded 630 pounds. Owing to a recurrence of dry weather in the spring of 1921, only one planting was made. This was on April 15 and yielded 425 pounds.

In 1922 the interval between plantings was increased to one-half of a month, and six plantings of Lone Star were made between the middle of April and July 1. The April 15 planting was washed out by heavy rains on April 24. The other plantings, in order from May 1, yielded 675, 563, 643, 725, and 463 pounds, respectively.

In 1923 to 1929, inclusive, the experiment was continued on the same plan, with Mebane on 0.08-acre plots. Rowden and Burnett were added to the tests in 1924. Bennett was planted in place of Burnett in 1927, and Half and Half was substituted for it in 1929. The results of the tests on Mebane, Rowden, and Burnett, as measured in pounds of seed cotton per acre, are given in Table 17.

TABLE 17.—*Annual and average acre yields of seed cotton at Big Spring, Tex., from plantings made at different dates during the years specified*

Variety and date of planting	Acre yields (pounds) in—							
	1923	1924	1925	1926	1927	1928	1929	Average
Mebane:								
April 15	0	696	--------	686	0	905	0	381
May 1	750	622	811	713	0	1, 361	1, 313	796
May 15	912	675	693	763	(1)	1, 093	957	849
June 1	694	850	825	950	677	1, 028	888	845
June 15	1, 000	--------	598	1, 125	930	1, 200	950	967
July 1	325	--------	138	900	583	0	700	441
Rowden:								
April 15	--------	--------	--------	650	750	831	0	558
May 1	--------	575	486	813	683	1, 005	850	735
May 15	--------	663	583	800	(1)	1, 044	800	778
June 1	--------	950	675	938	687	1, 164	563	830
June 15	--------	--------	756	825	763	1, 050	600	799
July 1	--------	--------	338	200	342	0	657	307
Burnett:								
April 15	--------	--------	--------	1, 621	--------	857	--------	1, 239
May 1	--------	606	613	1, 325	--------	1, 092	--------	909
May 15	--------	610	496	913	--------	1, 329	--------	837
June 1	--------	760	638	1, 113	--------	1, 256	--------	942
June 15	--------	--------	893	1, 106	--------	0	--------	666
July 1	--------	--------	450	0	--------	0	--------	150

[1] No planting on May 15 was made in 1927, because the soil was too dry.

The first planting in 1923 came up to a good stand, but was destroyed by blowing soil. A planting was made on July 15 that year, but was killed by frost before any of its bolls matured.

In 1924 only three plantings were planned for Rowden and Burnett, and the last two plantings of Mebane were not made because the soil was too dry to germinate the seed. The April 15 planting was omitted in 1925 on account of the lack of moisture in the soil. None of the July 1 planting of Burnett in 1926 matured before frost. The April 15 and May 1 plantings of Mebane in 1927 were destroyed by blowing soil. No plantings were made on May 15 because the soil was too dry. Frost killed the June 15 planting of Burnett and the July 1 planting of all varieties in 1928 before any bolls matured. The April 15 plantings of Mebane and Rowden in 1929 were destroyed by a sand storm.

The yields of Bennett in 1927, by plantings, were: April 15, 1,200 pounds; May 1, 748 pounds; May 15, not planted; June 1, 583 pounds; June 15, 712 pounds; and July 1, 555 pounds. The yields of Half and Half in 1929, from plantings made at the same intervals and in the same order, were 571, 700, 675, 712, 1,075, and 900 pounds.

Burnett in 1926 and Bennett in 1927 produced their highest yields from plantings made on April 15, but that date is too early to rely on for planting cotton at Big Spring. There is a great hazard of having the young plants destroyed by blowing soil. Even when conditions were favorable, neither Mebane nor Rowden have produced as high yields from plantings on April 15 as they have from some later dates.

By May 1 the chance of losing the crop is greatly reduced, but yields from plantings made on that date are seldom better than those from later dates before July 1, and do not usually average so high.

The best planting period would seem to be from May 15 up to and including the first week in June. Soil and moisture conditions during this time are usually favorable toward obtaining good stands. Plantings made as late as June 15 often return good yields, but it is sometimes difficult to obtain good stands from them. Cotton planted at that time generally opens slowly, and many bolls fail to mature before frost. June 15 should be considered the latest planting date from which a profitable yield can be expected under normal conditions. The average yields of Mebane, Rowden, and Burnett from June 15 plantings have been more than double those from July 1 plantings.

SPACING EXPERIMENTS

Spacing experiments with cotton were conducted from 1923 to 1929, inclusive. Acala was used in these experiments in 1923 and Mebane in the other years. The planting dates in the different years ranged from May 20 to May 28, except in 1928, when suitable stands for spacing tests were not obtained, and it was necessary to replant on June 5. The unit of experimentation was the 4-row plot of 0.04 of an acre in rows 44 inches apart and of 0.08 of an acre in rows 88 inches apart. After the first two years six rows were grown, but acre yields were computed from the yields of the four inside rows. Most of the plots were replicated from two to four times. Thinning was done at an early stage of growth. A close approximation to the desired spacing generally was obtained. The distance between rows and the spacing of the plants in the rows have been under trial. It is not the writer's intention to discuss this experiment in detail in the present circular, but a summary of the results is given in Table 18. The yields indicate the ability of the cotton plants to adjust themselves to a wide range of spacing and style of thinning in the rows and to a wide difference in the distance between rows. Both of these points are of great importance in the elimination of hand labor. A 7-year average from 1923 to 1929 is available for spacings up to 12 inches only. During this period the highest average yield in rows 44 inches apart was obtained by thinning to hills of two plants each at intervals of 12 inches. Between single plants spaced 3, 6, and 12 inches apart there was little difference. As stated in a footnote to the table, the yields tabulated under 3-inch spacing in 1923 and 1924 were the yields from unthinned plots with plants at average intervals of 4.6 and 2.5 inches, respectively.

The average yield of 18-inch spacing in rows 44 inches apart is high because of the record of an unduplicated plot in 1927. The average results indicate the desirability of a 12 to 24 inch spacing with two plants in a hill.

Increasing the distance between rows to 88 inches did not appear to reduce the average yield per acre. When the distance between the rows was doubled the yield per row was doubled. Even with rows separated by as much as 88 inches, the plants are able to adjust themselves to wide differences in thinning.

TABLE 18.—*Annual and average acre yields of seed cotton grown in spacing experiments in rows 44 and 88 inches apart at Big Spring, Tex., 1923–1929*

Distance between rows and spacing in the row	Acre yields (pounds) in—								
								Average	
	1923	1924	1925	1926	1927	1928	1929	1923 to 1929	1925 to 1929
Rows 44 inches apart:									
3 inches	[1] 879	[2] 582	395	604	593	753	610	631	591
6 inches	838	508	[3] 429	496	596	794	683	621	600
12 inches	815	420	463	527	[3] 600	758	752	619	620
12 inches (2 plants per hill)	956	548	436	680	583	741	740	669	636
18 inches	------	------	493	571	870	702	821	------	691
18 inches (2 plants per hill)	------	------	580	682	660	683	782	------	677
24 inches	971	------	495	517	[3] 665	642	790	------	622
24 inches (2 plants per hill)	------	------	545	675	703	584	774	------	656
Rows 88 inches apart:									
3 inches	------	------	359	642	------	788	730	------	------
6 inches	1, 105	------	------	------	748	900	743	------	------
12 inches	------	642	306	722	770	775	750	------	665
12 inches (2 plants per hill)	------	------	320	794	556	850	738	------	652
18 inches	------	------	------	574	568	------	835	------	------
18 inches (2 plants per hill)	------	------	411	------	655	818	545	------	------
24 inches (2 plants per hill)	------	------	------	522	------	------	------	------	------

[1] Average for 12 unthinned plots. Average space 4.6 inches.
[2] Average for 7 unthinned plots. Average space 2.5 inches.
[3] Interpolated.

GRAIN SORGHUMS

The tests conducted in cooperation with the Division of Cereal Crops and Diseases consist of varietal trials of grain sorghums, rate-of-seeding trials with milo and Kafir, and date-of-seeding trials with milo, Kafir, and feterita.

VARIETAL EXPERIMENTS

The standard varieties of grain sorghums and a large number of new varieties are included in this test, of which the purposes are to determine the relative values of standard varieties and the possibilities of the new ones, and to find if possible new varieties that are superior to those now being grown.

The varieties were grown on 0.1-acre plots in duplicated series from 1915 to 1921, inclusive; on single 0.08-acre plots from 1922 to 1926, inclusive; and on 0.04-acre plots in duplicated series from 1927 to 1929, inclusive. All varieties were planted at the same time, generally between May 15 and June 1, and thinned to a distance of 14 inches apart in the row.

The yields of varieties that were grown more than two years during the period from 1915 to 1929, inclusive, are given in Table 19. Averages are shown for the three periods 1915 to 1928, 1922 to 1929, and 1927 to 1929, inclusive. Kafir was calculated at 60 pounds to the bushel, and the other crops at 58 pounds.

TABLE 19.—*Annual and average acre yields of grain sorghums grown in varietal experiments at Big Spring, Tex., 1915–1929*

Variety	C. I.[1] No.	Acre yields (bushels)[2] in—																	
		1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average		
																	1915 to 1928	1922 to 1929	1927 to 1929
Dwarf Yellow milo	332	47.4	15.1	0	0	36.0	38.3	19.8	31.0	31.6	15.2	11.9	23.8	14.5	36.0	13.6	22.9	22.2	21.4
Standard Yellow milo	254	28.5	22.8	0	3.3	35.1	38.6	18.4	27.6	30.9	16.6	13.6	17.2	11.1	29.5	------	20.9	------	------
Standard White milo	352	25.0	16.1	0	5.3	38.1	25.2	18.8	22.4	30.3	14.8	10.9	21.2	14.7	28.4	------	19.4	------	------
Feterita	182	34.4	22.9	0	0	20.0	22.4	18.3	23.4	26.4	16.2	5.9	15.5	17.1	17.9	11.3	17.2	16.7	15.4
Standard Blackhull Kafir	71	------	24.6	0	0	36.6	29.0	17.7	28.2	35.8	6.7	11.8	26.5	17.0	42.3	8.2	------	22.1	22.5
Red Kafir	34	21.3	10.1	0	0	40.8	41.7	15.3	16.3	19.0	9.2	14.8	26.3	15.0	25.7	------	18.3	------	------
Sunrise Kafir	472	24.6	26.3	0	0	35.6	30.1	16.7	17.3	18.7	14.2	12.7	19.0	13.6	29.5	------	18.5	------	------
Dawn Kafir	340	38.7	13.6	0	2.5	44.8	38.8	14.8	19.0	18.3	5.8	12.7	19.0	16.3	28.7	10.0	19.5	16.2	18.3
Shallu	85	------	24.6	0	0	23.8	51.8	7.7	5.7	22.7	10.7	18.3	13.3	------	------	------	------	------	------
Brown kaoliang	------	12.8	------	------	------	22.3	17.7	15.7	7.7	18.2	9.2	------	------	------	------	------	------	------	------
Blackhull kaoliang	------	------	------	------	------	30.8	25.7	18.8	19.0	26.0	13.8	8.8	16.3	------	------	------	------	------	------
Schrock Kafir	------	------	------	------	------	------	------	17.8	14.2	20.8	5.7	14.3	28.0	15.7	34.0	12.0	------	18.1	20.6
Hegari	620	------	------	------	------	------	------	0	7.7	14.0	2.7	15.7	30.8	15.7	23.2	22.1	------	16.5	20.3
Reed Kafir	------	------	------	------	------	------	------	------	28.3	24.8	14.0	16.0	26.5	16.5	37.3	23.2	------	23.3	25.7
Pink Kafir	------	------	------	------	------	------	------	------	18.8	21.0	15.0	12.5	21.5	12.8	32.3	------	------	------	------
Spur feterita	------	------	------	------	------	------	------	------	29.8	27.4	14.7	9.3	19.5	16.7	27.4	15.8	------	20.1	20.0
Darso	------	------	------	------	------	------	------	------	19.7	25.0	13.0	9.7	26.8	13.2	23.8	------	------	------	------
Dwarf feterita	------	------	------	------	------	------	------	------	------	19.8	19.4	9.5	18.3	19.3	20.7	17.1	------	------	19.0
Pearl Kafir	------	------	------	------	------	------	------	------	------	------	------	------	19.8	17.2	23.7	------	------	------	------
Bishop Kafir	------	------	------	------	------	------	------	------	------	------	------	------	------	16.8	30.7	6.7	------	------	18.1
Smith milo × Kafir	------	------	------	------	------	------	------	------	------	------	------	------	------	14.3	25.7	11.3	------	------	17.1
Fargo Straight-neck milo	------	------	------	------	------	------	------	------	------	------	------	------	------	18.6	23.6	8.0	------	------	16.7
Wonder kafir	------	------	------	------	------	------	------	------	------	------	------	------	------	11.1	22.0	12.3	------	------	15.1
Early Red Kafir	------	------	------	------	------	------	------	------	------	------	------	------	------	11.4	22.0	13.8	------	------	15.7
Texas Blackhull Kafir	------	------	------	------	------	------	------	------	------	------	------	------	------	10.7	26.3	13.6	------	------	16.9
Hybrid Dwarf feterita	------	------	------	------	------	------	------	------	------	------	------	------	------	10.2	12.8	9.8	------	------	10.9
Premo Kafir	------	------	------	------	------	------	------	------	------	------	------	------	------	10.3	28.8	15.8	------	------	18.3
Chiltex Kafir	------	------	------	------	------	------	------	------	------	------	------	------	------	10.8	27.3	14.0	------	------	17.4
Bishop Desert Kafir	------	------	------	------	------	------	------	------	------	------	------	------	------	15.9	23.2	9.7	------	------	16.3

[1] "C. I." refers to accession number of the Division of Cereal Crops and Diseases (formerly Office of Cereal Investigations).

[2] Kafir, 60 pounds; others, 58 pounds, per bushel.

Only three varieties were grown in all of the 15 years. Their average yields were: Dwarf Yellow milo, 22.3 bushels; Dawn Kafir, 18.9 bushels; and feterita, 16.8 bushels. Standard Yellow milo and Standard White milo were grown for 14 years. The Standard

Yellow averaged 2 bushels less and the Standard White 3.5 bushels less than the Dwarf Yellow for the same period. The Dwarf Yellow is easier to harvest than the Standard, and its color is preferred to that of the White.

Spur feterita was grown from 1922 to 1929, inclusive. It averaged 3.4 bushels more than common feterita and 2.1 bushels less than Dwarf Yellow milo for the same period. Dwarf feterita from 1923 to 1929 averaged 1.9 bushels more than common feterita and 3.2 bushels less than Dwarf Yellow milo. The feteritas mature considerably earlier than the milos or Kafirs. This makes feterita desirable for planting after it is too late for the others. The feteritas also have considerable value as roughage feed in the bundle.

Standard Blackhull and Reed have been the high-yielding Kafirs. From 1916 to 1929, inclusive, Standard Blackhull Kafir averaged 20.3 bushels to the acre, which was only 0.2 bushel less than the average of Dwarf Yellow milo for the same years. Reed Kafir was grown from 1922 to 1929, inclusive. Its average yield for these eight years was higher than that of any other grain sorghum. It averaged 1.2 bushels more than Standard Blackhull Kafir and 1.1 bushels more than Dwarf Yellow milo. A number of new varieties were grown from 1927 to 1929, inclusive, but Reed Kafir, with an average of 25.7 bushels, was the highest yielding variety during this period. The Kafirs are valuable for forage as well as for grain and are grown for feeding in the bundle rather than in the head or after being threshed.

DATE-OF-SEEDING EXPERIMENTS

Date-of-seeding tests with grain sorghums were conducted from 1919 to 1929, inclusive. The plan of the experiment called for six plantings at half-monthly intervals from April 15 to July 1. Plantings were made each year on the designated dates or as near them as practicable. The annual and average yields from these plantings are given in Table 20.

TABLE 20.—*Annual and average acre yields of grain sorghums planted at different dates at Big Spring, Tex., during the years specified from 1919 to 1929*

Variety and date of planting	Acre yields (bushels) in—											
	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Dwarf Yellow milo:												
April 15	63.3	0	21.4	0	12.9	7.6	0	10.0	7.1	13.1	7.6	13.0
May 1	46.9	0	0	38.4	35.3	9.3	4.0	22.9	12.8	18.1	7.9	17.8
May 15	60.7	0	0	26.4	27.2	18.1	11.4	27.8	0	20.5	9.7	18.3
June 1	46.6	51.0	28.8	31.2	37.2	13.6	14.0	29.1	14.5	31.9	13.4	28.3
June 15	43.1	48.4	24.3	26.6	37.1	0	17.2	34.1	13.8	37.9	19.8	27.5
July 1	32.8	42.8	19.0	6.0	17.1	0	18.8	25.5	15.5	22.4	27.1	20.6
Dawn kafir:												
April 15	39.5	0	10.3	0	14.0	1.7	0	8.8	12.5	19.2	------	10.6
May 1	36.3	0	0	20.2	21.8	2.5	11.5	15.2	11.7	22.3	------	14.2
May 15	42.3	0	0	15.8	14.8	4.7	14.3	18.3	0	25.7	------	13.6
June 1	30.8	32.5	19.5	20.2	14.3	9.0	13.8	22.2	11.3	27.2	------	20.1
June 15	28.3	20.8	8.8	13.3	20.2	0	13.2	23.2	13.3	31.5	------	17.3
July 1	20.5	30.3	3.7	2.2	16.5	0	19.0	16.5	12.2	17.3	------	13.8
Common feterita:												
April 15	------	------	------	0	15.5	1.3	0	11.7	12.9	7.6	10.9	7.5
May 1	------	------	------	19.7	20.9	.9	7.6	16.2	14.7	8.6	14.8	12.9
May 15	------	------	------	17.1	12.8	2.6	12.2	16.9	0	9.7	18.6	11.2
June 1	------	------	------	32.6	9.5	16.8	10.9	17.2	17.1	29.3	21.2	19.3
June 15	------	------	------	22.4	23.3	0	10.9	20.0	16.4	28.4	19.5	17.6
July 1	------	------	------	13.1	13.8	0	14.0	23.4	15.5	21.2	16.2	14.7
Reed kafir:												
April 15	------	------	------	0	19.7	4.8	0	18.8	9.8	20.2	2.7	9.5
May 1	------	------	------	23.3	15.5	8.3	15.5	29.0	13.8	23.5	3.2	16.5

TABLE 20.—*Annual and average acre yields of grain sorghums planted at different dates at Big Spring, Tex., during the years specified from 1919 to 1929*—Contd.

Variety and date of planting	Acre yields (bushels) in—											
	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Reed Kafir—Continued.												
May 15	------	------	------	24.7	15.5	11.7	17.3	34.8	0	25.7	7.2	17.1
June 1	------	------	------	26.8	10.0	19.2	13.5	32.2	16.3	29.7	8.0	19.5
June 15	------	------	------	16.0	27.7	0	14.0	26.3	22.2	32.3	18.0	19.6
July 1	------	------	------	6.3	17.0	0	20.8	20.2	20.5	17.7	26.8	16.2
Dwarf feterita:												
April 15	------	------	------	------	11.0	8.8	------	------	------	------	------	9.9
May 1	------	------	------	------	14.7	6.7	------	------	------	------	------	10.7
May 15	------	------	------	------	15.3	15.5	------	------	------	------	------	15.4
June 1	------	------	------	------	25.0	7.6	------	------	------	------	------	16.3
June 15	------	------	------	------	18.1	0	------	------	------	------	------	9.1
July 1	------	------	------	------	13.1	0	------	------	------	------	------	6.6
Spur feterita:												
April 15	------	------	------	------	------	------	0	12.6	10.3	14.7	------	9.4
May 1	------	------	------	------	------	------	5.3	14.0	12.8	0	------	8.0
May 15	------	------	------	------	------	------	9.1	17.8	0	0	------	6.7
June 1	------	------	------	------	------	------	20.0	15.3	11.0	25.9	------	18.1
June 15	------	------	------	------	------	------	8.6	15.3	19.0	20.3	------	15.8
July 1	------	------	------	------	------	------	12.9	11.7	8.8	14.8	------	12.1
Hegari:												
April 15	------	------	------	------	------	------	------	------	6.8	31.5	16.5	18.3
May 1	------	------	------	------	------	------	------	------	8.8	36.5	16.3	20.5
May 15	------	------	------	------	------	------	------	------	0	0	19.0	6.3
June 1	------	------	------	------	------	------	------	------	10.2	43.8	15.0	23.0
June 15	------	------	------	------	------	------	------	------	16.7	42.5	21.0	26.7
July 1	------	------	------	------	------	------	------	------	16.5	21.0	26.2	21.2
Standard Blackhull Kafir:												
April 15	------	------	------	------	------	------	------	------	14.7	23.0	18.0	18.6
May 1	------	------	------	------	------	------	------	------	13.8	34.8	10.5	19.7
May 15	------	------	------	------	------	------	------	------	0	34.2	10.8	15.0
June 1	------	------	------	------	------	------	------	------	14.7	27.2	8.5	16.8
June 15	------	------	------	------	------	------	------	------	21.7	32.7	20.7	25.0
July 1	------	------	------	------	------	------	------	------	23.3	22.7	29.8	25.3

The June 1 planting in 1919 was replanted on June 19, when the mid-monthly planting was made. The soil was too dry to plant on the first three dates in 1920 and on the second and third dates in 1921. The April 15 plantings washed out in 1922. The June 15 and July 1 plantings were not made in 1924 because the soil was too dry to germinate the seed. It was too dry to make the April 15 planting in 1925 or the May 15 planting in 1927. In 1928 heavy rains destroyed the stands of the May 1 and May 15 plantings of Spur feterita and the May 15 planting of hegari. In the cases cited, where soil conditions prevented seeding or where the stand was destroyed, the yields have been entered in the table as zero, and the years have been included in calculating the averages. Such treatment is subject to question but is believed to be fair when dealing with the expectations of results from planting at arbitrarily fixed dates. Any other treatment would modify to a greater or less extent the quantitative results, but would not change the major conclusions to be drawn from the experiment.

The thinnest stands generally were obtained from the first two plantings, especially from those made as early as the middle of April. Dry soil, cold soil, and soil blowing were the responsible factors. Plantings made on these dates were the first to mature and were generally damaged by birds eating the seeds before they were ripe.

Weather and soil conditions are generally more favorable for planting between May 15 and June 15 than they are either earlier or later. The highest average yields have been obtained from the June 1 and June 15 plantings. Grain sorghums planted on or about these dates have been able to take advantage of late summer rains, when earlier plantings have been too mature to be benefited by them.

SPACING EXPERIMENTS

Spacing tests were conducted with Dwarf Yellow milo and Dawn Kafir from 1918 to 1926, inclusive. Spacings of 6, 12, 18, 24, and 30 inches between plants in rows 44 inches apart were under trial in each of the 9 years. Spacings of 3, 6, 9, 12, and 15 inches between plants in rows 88 inches apart were under trial in 1919, 1920, and 1921. Each plot was planted thickly and thinned to the desired stand or as near it as practicable. The annual and average yields of milo and Kafir with the different spacings are given in Table 21.

TABLE 21.—*Annual and average acre yields of Dwarf Yellow milo and Dawn Kafir grown in spacing experiments in rows 44 and 88 inches apart, at Big Spring, Tex., 1918–1926*

DWARF YELLOW MILO

Distance between rows and spacing in rows	Acre yields (bushels) in—										
	1918	1919	1920	1921	1922	1923	1924	1925	1926	Average	
										1918 to 1926	1919 to 1921
Rows 44 inches apart:											
6 inches	0	44.5	39.8	19.8	31.4	41.6	8.6	7.9	1.4	21.7	34.7
12 inches	0	36.2	40.2	28.4	32.6	35.3	10.7	12.2	3.4	22.1	34.9
18 inches	0	58.6	38.1	23.6	30.0	34.3	13.1	12.2	4.3	23.8	40.1
24 inches	0	61.2	24.7	26.7	27.2	31.0	11.7	12.2	6.4	22.3	37.5
30 inches	7.7	46.0	38.4	34.7	25.2	29.8	9.7	11.2	9.1	23.5	39.7
Rows 88 inches apart:											
3 inches	------	41.9	37.2	12.6	------	------	------	------	------	------	30.6
6 inches	------	28.6	25.5	28.3	------	------	------	------	------	------	27.5
9 inches	------	42.8	30.9	22.6	------	------	------	------	------	------	32.1
12 inches	------	41.0	19.8	24.8	------	------	------	------	------	------	28.5
15 inches	------	31.7	31.7	26.4	------	------	------	------	------	------	29.9
DAWN KAFIR											
Rows 44 inches apart:											
6 inches	0.9	43.7	41.0	14.8	19.7	21.7	1.5	16.5	26.7	20.7	33.2
12 inches	1.2	30.5	20.2	20.2	18.0	19.0	5.2	14.3	26.2	17.2	23.6
18 inches	2.5	29.3	29.5	14.0	14.2	17.5	6.7	14.7	22.8	16.8	24.3
24 inches	3.7	25.5	25.2	16.7	12.7	15.2	5.5	13.5	20.0	15.3	22.5
30 inches	4.6	19.0	32.0	11.8	9.8	14.7	7.7	11.5	18.0	14.3	20.9
Rows 88 inches apart:											
3 inches	------	36.5	28.3	13.2	------	------	------	------	------	------	26.0
6 inches	------	24.7	21.7	15.2	------	------	------	------	------	------	20.5
9 inches	------	26.8	22.3	11.3	------	------	------	------	------	------	20.1
12 inches	------	20.0	22.7	14.3	------	------	------	------	------	------	19.0
15 inches	------	20.8	24.3	12.2	------	------	------	------	------	------	19.1

The average yield of milo over a series of years was not greatly influenced by the spacing of the plants within the limits under trial. The 9-year average yields in the ordinary rows (44 inches apart) were 21.7 bushels with 6-inch spacing, 22.1 bushels with 12-inch spacing, 23.8 bushels with 18-inch spacing, 22.3 bushels with 24-inch spacing, and 23.5 bushels with 30-inch spacing.

The lack of material difference in the yields with different spacings is due to the fact that within certain limits milo plants sucker in proportion to the space given them. A spacing of about 18 inches is to be preferred, because with it the maximum yields are produced and drought is withstood better than with closer spacings.

The three years when rows 88 inches apart were under trial were years of high production. During this period the average yields from plantings in these widely spaced rows were less than those from the rows 44 inches apart. A more extended study of the subject[3] showed that the average yields of Dwarf Yellow milo were reduced about 2 per cent by growing the plants in widely spaced rows (80 to 88 inches apart), when the number of plants per acre was the same as in rows 40 to 44 inches apart. In the experiment at Big Spring the effect of different spacing of the plants in 88-inch rows was not conclusively shown, although the highest average yield was from the 9-inch spacing.

The average yields of Dawn Kafir both in the rows spaced 44 inches apart and in those 88 inches apart were highest with the closest spacing and tended to decrease with increasing distance between plants. Dawn Kafir suckers very little, so the number of stalks producing heads is reduced as the spacing is increased. The 6-inch spacing is more sensitive to moisture conditions than the wider spacings. It does not stand drought so well, but yields more in the better years. The 9-year average yield of the 6-inch spacing in regular rows was 20.7 bushels, and the average yield of the 12-inch spacing was 3.5 bushels less. The rows spaced 88 inches apart were under trial during three years more favorable than the average. The 3-inch spacing averaged 26 bushels, and the 12-inch and 15-inch spacings averaged 19 and 19.1 bushels, respectively. During the same years the 6-inch spacing in rows 44 inches apart averaged 33.2 bushels, and the lowest yield in such rows was 20.9 bushels, from the 30-inch spacing.

FORAGE SORGHUMS

The experiments with forage sorghums, in cooperation with the Division of Forage Crops and Diseases, have consisted of variety tests of sorghums, with corn and millet added in some years for comparison, and date-of-seeding tests with Sumac sorgo, Red Amber sorgo, and Sudan grass.

VARIETAL EXPERIMENTS

The varietal experiments dealt primarily with the standard or well-known forage sorghums and a number of new varieties. Some grain sorghums, corn, and millet were included for comparison with the forage sorghums. Sunrise Kafir and Sudan grass were grown in the ordinary cultivated rows and in close drills. As these varieties were grown for forage, the yields are given in total pounds of cured forage per acre without consideration of the proportion that may have been seed.

The annual yields of all varieties that were grown for more than two years during the period from 1915 to 1929, inclusive, are given in Table 22. Average yields for the eight years from 1922 to 1929 are also given.

The heaviest yielding variety under trial was Honey sorgo. This returned average yields of 8,803 pounds per acre for the 8 years from 1922 to 1929 and 8,917 pounds for the 15 years from 1915 to 1929. Sumac and White African were the next highest yielding varieties. During the 14 years that both were grown, Honey averaged 576 pounds more than Sumac. Sumac does not grow so tall as Honey and is not so easily lodged by high winds. Honey averaged over 1,500 pounds more than White African during the 13 years that the latter was grown. White African is coarser and drier than Honey and Sumac and has never become very popular in spite of its high-yielding quality.

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[3] MARTIN, J. H., and SIEGLINGER, J. B. (assisted by SWANSON, A. F., BURNHAM, D. R., CLEMMER, H. J., COLES, E. H., KEATING, F. E., and OSBORN, W. M.). SPACING AND DATE OF SEEDING EXPERIMENTS WITH GRAIN SORGHUMS. U. S. Dept. Agr. Tech. Bul. 131, 47 p., illus. 1929.

TABLE 22.—*Annual and average acre yields of sorghums and other crops grown for forage in varietal experiments at Big Spring, Tex., 1915–1929*

Variety	Acre yields (pounds) in—							
	1915	1916	1917	1918	1919	1920	1921	1922
Red Amber	9,110	4,000	0	990	6,810	7,200	3,960	4,000
Sumac	20,020	--------	0	770	9,060	15,500	6,600	8,780
Honey	15,740	13,060	0	595	9,200	19,750	4,980	9,250
Freed	4,680	5,420	0	--------	6,040	4,400	3,470	3,350
Orange	12,950	3,760	0	725	9,560	9,330	4,710	3,750
Black Amber	6,060	3,300	0	860	7,110	6,970	3,730	--------
White African	--------	6,760	0	625	10,590	17,100	6,270	7,010
Darso	--------	--------	--------	585	6,980	5,990	3,130	--------
Seeded Ribbon	--------	--------	--------	--------	10,630	9,750	4,590	4,560
Sudan grass (rows)	--------	--------	--------	--------	14,100	9,160	--------	3,100
Sudan grass (drilled)	--------	--------	--------	--------	9,620	--------	--------	1,310
African millet	--------	--------	--------	--------	--------	--------	4,070	5,490
Kansas Orange	--------	--------	--------	--------	--------	--------	4,270	4,730
Mexican June corn	--------	--------	--------	--------	--------	--------	--------	2,830
Kursk millet	--------	--------	--------	--------	--------	--------	--------	630
Sunrise Kafir (drilled)	--------	--------	--------	--------	--------	--------	--------	1,800
Coleman	--------	--------	--------	--------	--------	--------	--------	5,400
Hussar	--------	--------	--------	--------	--------	--------	--------	4,260
Leoti	--------	--------	--------	--------	--------	--------	--------	--------
Sunrise Kafir (rows)	--------	--------	--------	--------	--------	--------	--------	--------
Sourless	--------	--------	--------	--------	--------	--------	--------	--------
Saccaline	--------	--------	--------	--------	--------	--------	--------	--------
Kafir X Sourless	--------	--------	--------	--------	--------	--------	--------	--------

Variety	Acre yields (pounds) in—							
	1923	1924	1925	1926	1927	1928	1929	Average, 1922–1929
Red Amber	3,250	1,850	2,625	4,700	2,610	5,910	2,000	3,368
Sumac	7,150	4,690	5,160	12,325	5,880	9,060	7,630	7,584
Honey	6,500	5,290	6,375	15,300	8,150	7,810	11,750	8,803
Freed	1,975	2,110	550	3,125	1,630	3,350	--------	--------
Orange	2,600	2,210	--------	--------	--------	--------	--------	--------
Black Amber	--------	--------	--------	--------	--------	--------	--------	--------
White African	4,875	6,000	--------	12,600	5,250	7,600	6,750	--------
Darso	--------	--------	--------	4,850	1,930	2,750	2,630	--------
Seeded Ribbon	3,800	3,860	--------	--------	--------	--------	--------	--------
Sudan grass (rows)	4,475	3,940	1,975	8,625	2,730	3,620	3,000	3,933
Sudan grass (drilled)	2,550	1,125	1,450	5,100	1,400	1,210	2,200	2,043
African millet	3,325	5,025	2,925	6,375	3,880	7,770	5,500	5,036
Kansas Orange	4,750	5,625	4,400	7,050	4,700	7,400	6,630	5,661
Mexican June corn	1,275	1,275	675	3,575	1,450	2,170	1,750	1,875
Kursk millet	1,200	0	275	1,300	310	0	1,750	683
Sunrise Kafir (drilled)	3,375	1,625	2,500	8,125	3,930	2,000	3,300	3,332
Coleman	5,880	4,450	--------	--------	--------	--------	--------	--------
Hussar	1,850	2,400	--------	--------	--------	--------	--------	--------
Leoti	2,450	2,560	2,125	4,475	1,950	6,350	2,000	--------
Sunrise Kafir (rows)	--------	--------	3,375	5,250	3,330	4,120	2,780	--------
Sourless	--------	--------	--------	8,300	5,680	6,850	--------	--------
Saccaline	--------	--------	--------	6,725	5,780	6,100	5,630	--------
Kafir X Sourless	--------	--------	--------	7,450	5,280	5,600	5,130	--------

The Mexican June corn harvested for forage averaged less than a ton to the acre for the eight years it was grown.

Sunrise Kafir averaged 200 pounds more when drilled close than when grown in cultivated rows.

Sudan grass in close drills for nine years averaged 2,885 pounds per acre, and in cultivated rows during the same years it averaged 5,063 pounds. Honey sorgo during the same years averaged 8,847 pounds.

Two cuttings a year are generally obtained from Sudan grass. As a forage crop, Sudan grass yields less than the best sorgos, but it finds a place as a pasture crop. In that capacity it excels all other crops available to the section.

Other sorghums in the test are of good quality, but none yield enough tonnage to compete seriously with Honey and Sumac for forage.

DATE-OF-SEEDING EXPERIMENTS

Date-of-seeding tests were conducted with Sumac sorgo from 1919 to 1929, inclusive; with Red Amber sorgo in 1919, 1920, and 1921; and with Sudan grass in cultivated rows from 1922 to 1929, inclusive. These trials were on 0.1-acre and 0.08-acre plots. The varieties under trial were planted at half-monthly intervals from April 15 to July 1, inclusive. The crops were harvested for forage, and the yields reported are the total weights of field-cured material.

TABLE 23.—*Annual and average acre yields of forage sorgos and Sudan grass planted at different dates at Big Spring, Tex., 1919–1929*

Variety and date of planting	Acre yields (pounds) in —											
	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Average
Sumac sorgo:												
April 15	16, 320	0	11, 100	0	6, 280	5, 600	0	12, 425	7, 250	6, 130	8, 120	6, 657
May 1	18, 400	0	0	11, 550	7, 750	4, 000	5, 425	9, 125	7, 750	7, 630	8, 120	7, 250
May 15	21, 400	0	0	9, 480	6, 620	4, 925	6, 650	9, 225	0	9, 350	8, 250	6, 900
June 1	17, 600	14, 000	8, 120	7, 330	6, 380	7, 500	5, 875	10, 725	6, 900	9, 130	8, 120	9, 244
June 15	14, 780	14, 500	5, 840	6. 630	8, 580	0	7, 575	11, 625	7, 080	8, 890	6, 630	8, 375
July 1	14, 400	14, 800	4, 840	2, 700	12, 870	0	7, 700	11, 125	5, 750	8, 280	7, 380	8, 168
Red Amber sorgo:												
April 15	9, 800	0	5, 600	------	------	------	------	------	------	------	------	5, 133
May 1	8, 440	0	0	------	------	------	------	------	------	------	------	2, 813
May 15	10, 900	0	0	------	------	------	------	------	------	------	------	3, 633
June 1	10, 080	6, 400	4, 020	------	------	------	------	------	------	------	------	6, 833
June 15	7, 700	5, 800	2, 600	------	------	------	------	------	------	------	------	5, 367
July 1	4, 900	3, 800	2, 000	------	------	------	------	------	------	------	------	3, 567
Sudan grass:												
April 15	------	------	------	0	4, 950	2, 150	0	2, 725	3, 380	4, 680	3, 400	2, 661
May 1	------	------	------	3, 980	4, 250	2, 275	1. 575	1, 875	5, 060	4, 380	3, 230	3, 328
May 15	------	------	------	3, 730	4, 500	4, 600	2, 175	3, 075	0	4, 100	3, 530	3, 214
June 1	------	------	------	4, 180	3, 575	3, 175	1, 010	3, 200	2, 940	3, 930	4, 080	3, 261
June 15	------	------	------	2, 680	4. 850	0	2, 050	4, 000	2, 780	4, 080	3, 550	2, 999
July 1	------	------	------	950	4, 875	0	2, 650	4, 875	2, 530	2, 300	3, 430	2, 701

The annual and average yields are given in Table 23. The scheduled plantings were not made on the first three dates in 1920, the second and third dates in 1921, the first date in 1922, the last two dates in 1924, or the third date in 1927, because the soil was too dry. The planting made on the first date in 1925 was washed out by a heavy rain. In Table 23 the yields of these scheduled plantings are given as zero, and the years are included in calculating the averages. Averages calculated in this manner indicate that the best dates for planting the sorgos are from June 1 to June 15. A closer study of the results shows great variation among individual years, some favoring early planting and some favoring late planting. The differences in the averages as calculated in Table 23 are to a large degree due to the fact that plantings could not always be made on certain dates. Weather and soil conditions in late May and early June are generally more favorable for obtaining good stands than they are either before or after that period. The condition of the weather and the water content of the soil at the time of planting are of much greater importance than the precise date, within the limits under consideration. Advantage may be taken of favorable conditions to plant as early as

April 15, but planting under conditions unfavorable for germinating the seed and maintaining growth should be avoided even though it delays planting until late in June. Fair to good yields of fodder may be produced by plantings made later than July 1, but they will not be so heavy as those from earlier plantings.

Sudan grass responds to the earlier dates of planting. In two of the years that it was under trial, the plantings made on April 15 gave heavier yields than any made on later dates. Soil conditions, however, do not always permit planting so early, and the planting season may be extended to June 15 without expectation of serious loss. Sudan grass makes two or three crops in a season when conditions, particularly of water supply, are favorable. Late plantings, especially those as late as July 1, generally make one cutting fewer than earlier plantings, and the yield from them is sharply reduced.

COWPEAS

The cowpea is one of the few legumes that can be grown successfully as field crops in the southern Great Plains. It can be used for green manure, hay, or seed. The experiments with cowpeas have been made in cooperation with the Division of Forage Crops and Diseases.

VARIETAL EXPERIMENTS

Varietal tests of cowpeas were conducted from 1915 to 1929, inclusive. The cowpeas were grown in cultivated rows 44 inches apart, with plants spaced about 12 inches apart in the row. The varietal-test plots were 0.1 of an acre from 1915 to 1918, inclusive, and in 1921. In 1917 and 1918 they were in duplicate series. In 1919 and 1920 0.3-acre plots were used. After 1921 the size of the plots was reduced to 0.08 of an acre. From 1915 to 1923, inclusive, the entire plot was harvested for hay, but from 1924 to 1929, inclusive, one-half of each plot was harvested for hay and one-half for seed.

Table 24.—*Average acre yields of hay and seed and the number of days from seeding to harvest of varieties of cowpeas at Big Spring, Tex., for the periods specified*

Group and variety	Average acre yields of hay			Average acre yield of seed, 1924 to 1929	Average time from planting to harvest
	1915 to 1929	1919 to 1929	1923 to 1929		
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Days*
Late:					
Brabham	2,349	2,868	2,510	229	100
Iron	2,513	2,305	1,939	348	100
Groit	2,349	2,094	1,679	406	95
Medium:					
Whippoorwill	----------	1,397	1,036	379	86
Purple Pod	----------	1,600	1,239	297	84
New Era	----------	1,605	1,429	456	83
Early Red	----------	----------	1,586	303	80
Early:					
Catjang	----------	----------	1,086	247	75
Early Buff	1,317	1,355	982	286	71
Blackeye	----------	1,429	979	292	68

The average yields of hay and seed for different periods are given in Table 24. The number of days from seeding to harvest for hay is also given in this table. There is a close relation between the length of this period and the yield of hay. Brabham, with a growing period of 100 days, averaged nearly 1.5 tons of hay for the 15 years from 1915 to 1929, inclusive. The vines of this variety are so coarse that they are slow to cure. Unless the weather is favorable for some time after harvest, they are liable to be badly damaged. This is also true of Iron, which had the same growing period and averaged 1.25 tons of hay. The third highest yield of hay was from Groit, which had a growing period of 95 days. Groit was second highest in the yield of seed, with a 6-year average of 406 pounds per acre. The highest yield of seed was from New Era, which averaged 456 pounds. Its average length of season was only 83 days.

SUMMARY

This circular reports the results of experiments conducted at Big Spring, Tex., from 1915 to 1929, inclusive, to determine the possibilities and the best methods of crop production.

The average annual precipitation for the 30 years from 1900 to 1929 was 18.77 inches. During that period the average seasonal precipitation from April to September, inclusive, was 13.01 inches. The elevation above sea level is about 2,500 feet.

Cotton is the principal cash crop of the locality. The grain sorghums are well adapted to prevailing conditions. Of this group of crops, milo produced the highest average yields of grain. Kafir did not yield so much grain as milo, but it is more valuable for forage. Feterita is adapted for use as a catch crop when late planting is necessary. Sumac and Honey sorgos were the heaviest-producing forage crops. Sudan grass is the best crop available for pasture. Cowpeas are valuable as a leguminous hay crop. Broomcorn can be successfully grown as a cash crop. Peanuts will produce both nuts and hay. The average yields of corn, wheat, beans, and millet are too low to warrant their being grown.

Fall and winter plowing or listing was generally better than spring plowing or listing. Cotton did not respond to fallow. The yields of other crops on summer fallow generally were materially higher than on land that produced a crop the preceding year, but the increases were hardly great enough to warrant extensive use of the method.

The yield and other characteristics of Mebane cotton make it a highly desirable variety. Lone Star and Acala also took high rank in a long-time test of varieties. The yield of Half and Half was high, but the staple of that variety is very short. Cotton was able to adapt itself to a considerable range in the spacing of the plants, but average results indicate the desirability of a 12 to 24 inch spacing with two plants in a hill. The best planting period appears to be from May 15 to June 15. July 1 is too late to plant cotton.

Dwarf Yellow milo, Reed Kafir, and Spur feterita were the highest yielding varieties of their respective groups of grain sorghums. The highest average yields of sorghums were from June 1 to June 15 plantings. Milo was able to adjust itself to a wide range of distances between plants, but a spacing of about 18 inches appears to be the most desirable. Kafir is less adaptable and requires a closer spacing. The highest yields of Kafir came from the closest spacing tried, 6 inches.

The highest yields of cowpea hay were from the latest maturing varieties, Brabham, Iron, and Groit. The highest yield of seed was from a midseason variety, New Era.

U. S. GOVERNMENT PRINTING OFFICE: 1932

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